Washington State Department of Transportation

SOUNDTRANSIT

Accommodating High-Capacity Transit in the SR 520 Corridor

Prepared for

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ACRONYMS

BRT	Bus Rapid Transit
BNSF	Burlington Northern Santa Fe Railroad
CEVP	Cost Estimate Validation Process
EIS	Environmental Impact Statement
EPR	Evergreen Point Road
HCT	High Capacity Transit
I-90	Interstate 90
I-405	Interstate 405
Link	Light Rail System being developed by Sound Transit, which includes Central Link and Tacoma Link
LRT	Light Rail Transit
PSRC	Puget Sound Regional Council
ROW	Right of Way
SR 520	State Route 520
ST	Sound Transit
WSDOT	Washington State Department of Transportation

1. BACKGROUND

Previous studies undertaken by the Puget Sound Regional Council (PSRC), King County Metro, and Sound Transit have led to the adoption of the Sound Move Long-Range Vision, Sound Transit's long-range transportation plan.[1] This plan includes a light rail line in the I-90 corridor with branches on the Eastside to serve portions of Eastgate, Bellevue, Issaquah, Kirkland, and Redmond, as shown in Figure 1-1.

According to travel forecasts developed during the multimodal phase of the Trans-Lake Washington Project, only one high-capacity transit (HCT) corridor across Lake Washington will be necessary to satisfy transit demands through the year 2020. The study further concluded that the total person throughput across the lake would not vary if the future HCT line was placed within either the I-90 or the SR 520 corridor.

The multimodal phase of this project also led to the following additional conclusions, as noted in *Summary of HCT Screening Process: Evaluations and Recommendations* (April 2002, draft document):

Overall Need for High-Capacity Transit

- Travel growth beyond the current forecast horizon of 2020 (in the cross-lake corridor) would have to be accommodated by increased transit capacity.

- An HCT extension from the Central Link line to the major Eastside travel markets (Bellevue, Redmond, and Kirkland) would result in an overall increase in daily person trips across the lake of 1 to 26 percent in 2020 and mode share of 10 percent compared to the No Action Alternative.

Advantages of the I-90 Corridor over SR 520

- An HCT line in the I-90 corridor would cost substantially less than a line in the SR 520 corridor.

- In the short to medium term, merging an SR 520 HCT line into Central Link would be feasible. However, in the longer term, when Central Link is extended beyond Northgate, the segment between the University of Washington and downtown Seattle will be capacity-constrained and another HCT line between the University and downtown will be required.

- Light rail transit (LRT) in the I-90 corridor would result in fewer environmental impacts than the HCT in the SR 520 corridor.

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1 "The Regional Transit Long-Range Vision" Adopted May 31, 1996, Central Puget Sound Regional Transit Authority

Based on the multimodal study work, the Translake executive committee chooses to continue planning for HCT in the I-90 corridor with an investment in BRT in the SR 520 corridor.

The Regional Transit Long-Range Vision

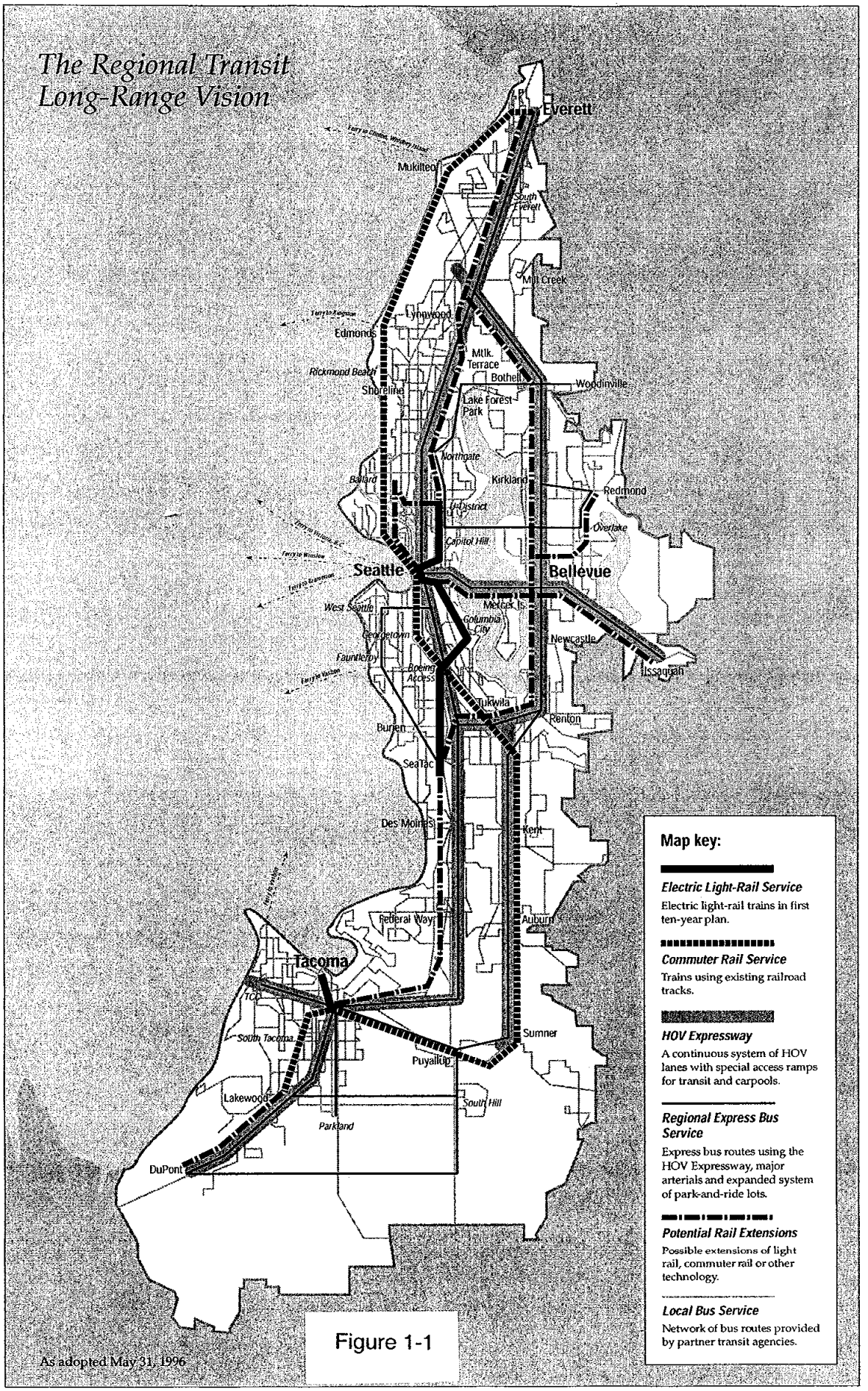


Figure 1-1

As adopted May 31, 1996

2. PURPOSE OF THIS STUDY

At some point beyond the planning horizon of Sound Transit's Long-Range Vision, it is possible that travel demand by transit could grow to a level that would justify a second trans-lake HCT corridor in addition to the I-90 corridor. Since both development of a third corridor across Lake Washington or expansion of the I-90 corridor is unlikely, the SR 520 corridor is the most viable option for the second corridor. While the timing of this need is difficult to predict, it could occur within the 50 to 75-year service life of the SR 520 improvements being contemplated as part of the current Trans-Lake Washington Project effort.

As a result, policy-level discussions need to occur regarding what actions should be taken now to preserve or accommodate future development of HCT facilities on the SR 520 corridor as part of the current Trans-Lake Washington Project effort. An informed decision requires that a number of issues need to be addressed. The issues include:

- What type of HCT technology should be planned for and what are the associated design requirements?
- What is the range of options available to preserve, accommodate, and even facilitate the possible future construction of HCT in the corridor?
- What are the most logical alignment locations and line configurations for a future SR 520 HCT line?
- What are the costs and implications of this range of options to the current roadway project? To what extent and how can these costs be born and the impacts be mitigated and/or justified within the context of the current project?
- What legal or procedural issues must be dealt with?

This document is developed as the first step in defining the parameters that can be used to answer the above questions. These parameters will be utilized in deciding to what extent accommodation should be included in the environmental assessment for the Trans-lake Washington project.

3. TECHNOLOGY AND OPERATIONAL CHOICES

Analyzing the accommodation of HCT in the SR 520 corridor requires the selection of a basic fixed-guideway technology upon which the HCT envelope would be based.

Light rail and commuter rail are the only technologies now being deployed for fixed guideway HCT service in the region. Commuter rail is not a candidate technology for the SR 520 corridor. Commuter rail is generally appropriate only where existing rail lines or rights of way facilitate the use of traditional locomotive hauled rail passenger cars. It requires relatively flat grades and stations that are spaced over five miles apart. In the SR 520 corridor, the grades are steep and the spacing of the stations proposed would be close, precluding optimal use of commuter rail technology.

LRT is a form of rail transit that can operate both on exclusive right of way and mixed with other traffic and cross-traffic. As such, it generally requires less costly infrastructure than systems that need exclusive right of way such as heavy rail or automated rubber tire systems.

Using the LRT-type envelope and design requirements would provide a good general basis for determining actions that might be needed now to accommodate future fixed guideway HCT development in the SR 520 corridor. While other technologies could be considered in the future, from the standpoint of the basic envelope and geometry, most other technologies could be accommodated within the requirements established by LRT standards.

In general, the design requirements of the HCT's fixed guideway envelope are a function of system capacity and speed of operation, not whether steel wheels, rubber tires, monorail beams, air cushion, or magnetic levitation are used. Systems with small radius curves and steep grades would be possible with any of these above technologies, but would result in speed limitations well below the desired 55 mph. Similarly, train vehicles with envelopes smaller than standard light rail cars would also be possible, but would severely limit the system's carrying capacity.

4. STUDY METHODOLOGY

In order to understand the range of strategic, policy, environmental, design, and right-of-way (ROW) implications, a set of scenarios were developed and studied. The scenarios range progressively from no accommodation to full preservation of the HCT corridor. The scenarios are:

- Scenario 1: No HCT Accommodation (Baseline Scenario)
- Scenario 2: HCT Accommodation on Floating Bridge
- Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures
- Scenario 4: HCT Envelope Preservation for Full Corridor

The study methodology consisted of sketching an approximate HCT alignment and cross-sections on roadway plans developed to date. A multidisciplinary team then identified the range of implications for each scenario, as well as the conceptual-level costs. The engineering and cost comparison work was done at a conceptual level and should only be used for general overall comparisons of the scenarios.

5. HCT ALIGNMENT

Although numerous alignment alternatives and variations could be analyzed to optimize cost, transit speed, and reliability, this report uses an HCT alignment based on the HCT alignment proposed during the multimodal screening phase of the Trans-lake project with some minor variations. This basic alignment serves the purpose of this study because it allows varying scenarios of accommodation and preservation to be applied, thus allowing the costs and implications to be summarized.

The alignment assumptions are listed as follows:

Montlake to 124th Avenue NE

- West of Montlake Boulevard, the HCT line would be in a subway and would turn either north to serve the University District or south to go to downtown Seattle.

- On the Lake Washington floating bridge, the HCT line would be located in the center of the bridge.

- On the east side of Lake Washington, the HCT line would travel in the center of the roadway under the structure/lid at Evergreen Point Road (EPR) and would transition out of the roadway between EPR Road and 84th Avenue NE, crossing over the westbound highway lanes. It would continue traveling on the north side of SR 520 passing underneath the structure at 84th Avenue NE.

- The HCT line would pass under the 84th Avenue NE westbound loop ramp with an HCT station be located just east of the loop ramp.

- The HCT alignment would pass under the 92nd Avenue NE lid and would continue along the north side of SR 520 toward Bellevue Way.

- Several alternative alignments could be considered for the HCT between Bellevue Way and 124th Avenue NE in the vicinity of the I-405 Interchange. These alternative alignments are shown in Figure 5-1 and are listed below. This analysis uses "Alternative A," which provides a good representation of the accommodation issues to be compared in the scenarios.

  - Alternative A - This alternative is based on the multimodal alignment, which follows the Burlington Northern-Santa Fe (BNSF) rail alignment from the vicinity of the South Kirkland park-and-ride lot through the I-405 interchange. An HCT station would be located on the eastern side of the I-405 interchange, from which the alignment would continue through a 1,200-foot cut-and-cover structure to reach the HCT alignment east of 124th Avenue NE.

  - Alternative B - This alignment would run parallel to Northup Way (on the north side), would have grade crossings at the termini of two of the interchange ramps, and would

avoid major cut-and-cover structures. Cut-and-cover structures at 120th Avenue NE and 124th Avenue NE might be desirable where this alignment continues to the east. An HCT station would be located on the eastern end of the I-405 interchange.

- Alternative C - This alignment would be located in the center of SR 520. The roadway alignment would need to be widened to provide for the HCT alignment and for the transit station.

- Alternative D - This alignment would follow the BNSF alignment to the point where the HCT alignment from I-90 curves towards the east to head east along SR 520. The alignment would turn east at this location.

124th Avenue NE to Redmond

The HCT alignment between 124th Avenue NE and Redmond follows the alignment developed during the multimodal phase of the Trans-Lake Washington Project. This segment also represents the eastern portion of the I-90 HCT alignment.

Due to the limited interaction of the highway and HCT alignments in this section of the SR 520 corridor, HCT accommodation and preservation are much more straightforward. There are only two critical locations—a potential cut-and-cover tunnel near the 51st Street NE interchange (just north of the Overlake Transit Center) and an elevated crossing near the intersection/interchange of SR 520 and NE Union Hill Road.

The HCT alignment analyzed is as described below:

- The HCT line would run parallel to the SR 520 highway lanes on the south side between 124th Avenue NE and NE 24th Street. At NE 24th Street, the HCT line would diverge from the SR 520 corridor and continue up NE 24th Street to serve a future HCT station located near NE 24th Street and 150th Avenue NE.

- The HCT line alignment would turn north on 156th Avenue NE and continue past the Microsoft campus to the Overlake Transit Center, where it would cross under SR 520 in the vicinity of the NE 51st Street interchange in a cut-and-cover tunnel to the west side of SR 520.

- The HCT line alignment would then parallel SR 520 to the west near the Sammamish River, where it would diverge from SR 520 to serve downtown Redmond.

- The HCT line alignment would again rejoin SR 520 at the Redmond Way/SR 202 interchange and cross over SR 520 at NE Union Hill Road to serve a future HCT station near the Bear Creek park-and-ride lot.

FILE: I-405 Vicinity Map
DATE: 08/09/02

LEGEND:

- HIGH OCCUPANCY VEHICLE LANE
- BIKE/PEDESTRIAN LANE
- SIGNALIZED INTERSECTION
- HIGH CAPACITY TRANSIT
- EXISTING RIGHT-OF-WAY
- TRAFFIC FLOW
- BARRIER

0 400 800

CHECKED BY:_____ DATE: _____

CONCEPTUAL DRAWING

THIS DRAWING IS INTENDED FOR ALTERNATIVE COMPARISON ONLY AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE

Trans-Lake Washington Project
Alternative HCT Alignments in the Vicinity of the I-405 Interchange
Figure 5-1

Washington State Department of Transportation
SOUNDTRANSIT

DRAWING:
SHEET:

6. DEFINITION AND ANALYSIS OF SCENARIOS

Definition and analysis of the scenarios studied are presented below. The scenarios are presented in order with a qualitative comparison being made between the implications of dealing with the described scenario in the Trans-Lake Washington Project (immediate future) vs. dealing with the issues in the future with a separate HCT project.

The only quantitative evaluation that has been done is a comparison of cost implications to the Trans-Lake Washington Project vs. the implications to a future HCT project. Costs and cost elements are summarized in Chapter 7.

6.1 ROADWAY ASSUMPTIONS

For the purposes of this study, the following assumptions have been made regarding the roadway:

- The current roadway alignments being developed by the Trans-Lake Washington Project engineering team are the basis for the discussion in this report.
- A distinction has not been made between the 6-lane and 8-lane alternatives. For the purposes of simplifying the issues, the footprint and cross-sectional analysis was done with the 8-lane alternative. The results would not be significantly different with an analysis of the 6-lane alternative.
- The Trans-Lake Washington Project will construct lidded structures in the vicinity of Montlake Boulevard, Evergreen Point Road, 84th Avenue NE, and 92nd Avenue NE for the 6- and 8-lane alternatives.
- Bus Rapid Transit (BRT) stations will be located in the SR 520 corridor in the vicinity of Montlake Boulevard, Evergreen Point Road, 92nd Avenue NE, Bellevue Way NE, and at the current Overlake park-and-ride lot at NE 40th Street. (An HOV direct access ramp is substituted for the NE 40th flyer stop in the 6-lane alternative).

The HCT and BRT stations are shown in Figure 6-1.

6.2 SCENARIO 1: NO HCT ACCOMMODATION (BASELINE SCENARIO)

In Scenario 1, there would be no roadway, floating bridge, or high-rise structure design modifications, or additional ROW acquired, as part of the Trans-Lake Washington Project to accommodate or preserve an HCT envelope in the long term.

This scenario is the same as Multimodal Alternatives 7 and 8, which both include a BRT as the long-term regional transit choice in this portion of the SR 520 corridor. A summary of the implications of Scenario 1 is included in Table 6-1; a schematic of this scenario is shown in Appendix A.

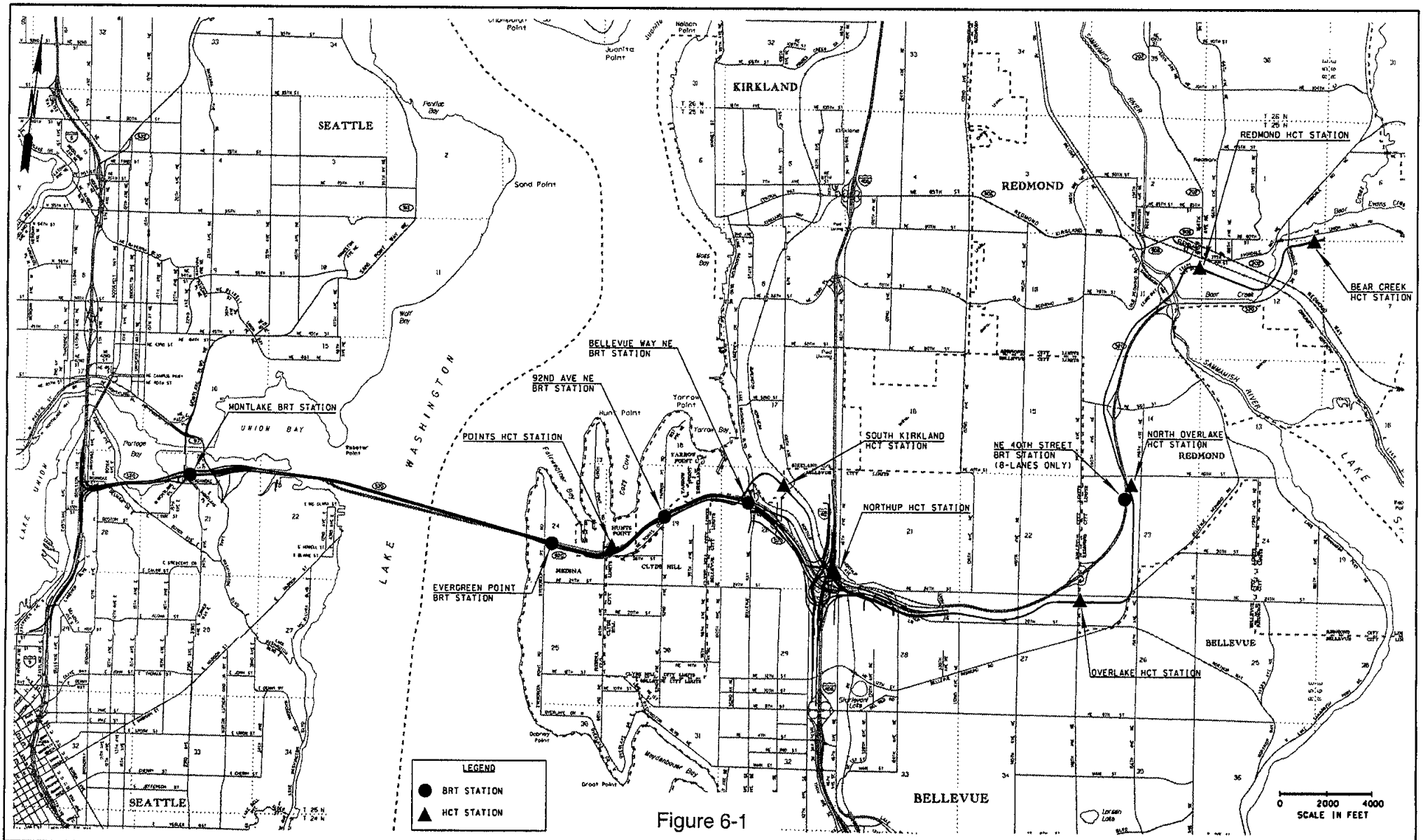


Figure 6-1

FILE NAME	t:\Engr\Jeff Brauns\BRT Station Vicinity.dgn				REGION NO.	STATE	FED.AID PROJ.NO.			SR 520 TRANS-LAKE WASHINGTON PROJECT
TIME	02:20:24 PM				10	WASH				BRT1
DATE	08/22/2002				JOB NUMBER					
DESIGNED BY					CONTRACT NO.		LOCATION NO.	P.E. STAMP BOX DATE	P.E. STAMP BOX DATE	Washington State Department of Transportation
ENTERED BY	C. CLARK									BRT/HCT STATION LOCATIONS
CHECKED BY	D. HILDERBRANT									SHEET 1 OF 1 SHEETS
PROJ. ENGR.	L. RUBSTELLO									
REGIONAL ADM.	D. DYE	REVISION	DATE	BY						

Table 6-1. No HCT Accommodation (Baseline Scenario)

	Montlake to 124th	124th to Redmond
Environmental Documentation Implications	**Trans-Lake:** • Does not need to address HCT issues at this time	**Trans-Lake:** • Does not need to address HCT issues at this time
	Future HCT: • EIS will be needed to address HCT corridor program at a future time. An analysis of alternatives and impacts can be done at that time.	**Future HCT:** • EIS will be needed to address HCT corridor program at a future time. An analysis of alternatives and impacts can be done at that time.
ROW Implications	**Trans-Lake:** • Does not need to address ROW issues over and above the roadway requirements at this time	**Trans-Lake:** • Does not need to address ROW issues over and above the roadway requirements at this time
	Future HCT: • All ROW needed for HCT will need to be acquired at a future time	**Future HCT:** • All ROW needed for HCT will need to be acquired at a future time
Roadway Design Implications for Trans-Lake Washington Project	**Trans-Lake:** • No Roadway design implications for Trans-Lake	**Trans-Lake:** • No Roadway design implications for Trans-Lake
Design Flexibility for HCT	**Future HCT** • Structural constraints, including floating bridge and lids, would be in place. Any alignments affecting these locations will be complicated and costly.	**Future HCT** • Future design opportunities are very flexible
Ease of Implementation of Future HCT in SR 520 Corridor	**Future HCT** • Very difficult to implement HCT alignment in the future since widening the floating bridge will be difficult	**Future HCT** • Moderately difficult to implement HCT alignment in the future since future cut-and-cover tunnel construction in vicinity of NE 51st Street and other structures in vicinity of Union Hill Road will present significant disruptions to highway traffic
Cost Implications	**Trans-Lake:** • No additional cost for Trans-Lake at this time	**Trans-Lake:** • No additional cost for Trans-Lake at this time
	Future HCT • $1,045 million – see Chapter 7 for cost elements	**Future HCT** • $147 million - see Chapter 7 for cost elements

6.3 SCENARIO 2: HCT ACCOMMODATION ON FLOATING BRIDGE

The basic assumption in Scenario 2 is that the floating bridge, approach structures, and the lid located at EPR are most critical and that the HCT alignment beyond the floating bridge is less easily defined at this stage.

A summary of the implications of Scenario 2 is included in Table 6-2; a schematic of this scenario is shown in Appendix B.

Table 6-2. Scenario 2 - HCT Accommodation on the Floating Bridge

	Montlake to 124th	124th to Redmond
Environmental Documentation Implications	**Trans-Lake:** • Wider pontoons should not complicate EIS • EIS documentation in vicinity of EPR may be difficult for EPR lid Option B due to added 4F impacts	**Trans-Lake:** • Does not need to address HCT issues at this time.
	Future HCT: • The future EIS would need to cover all HCT planned improvements not provided for by the initial highway project	**Future HCT:** • Environmental document for HCT would have to cover entire corridor from 124th Ave NE to Redmond
ROW Implications	**Trans-Lake:** • Would have to acquire additional ROW in vicinity of EPR lid for Option B. This may be difficult due to NEPA requirements • No other ROW would be required	**Trans-Lake:** • No effect on this part of the project
	Future HCT: • Except for EPR lid vicinity, all ROW needed for HCT will need to be acquired at a future time	**Future HCT:** • All ROW needed for HCT will need to be acquired at a future time
Roadway Design Implications for Trans-Lake Washington Project	**Trans-Lake:** • Floating bridge pontoons and substructure will need to be designed to support roadway deck plus a deck for future HCT that could be built at a later time • Approach span foundations (east and west side of lake) will need to be designed to accommodate HCT loads, even though the approach structures will be widened at a future time • EPR lid Option A will take some preliminary design work to ensure there are no conflicts with adding HCT in the future • EPR lid Option B will require that the lid be designed wide enough for future HCT (used in cost analysis) • Floating bridge superstructure and deck for HCT designed in future • Widening of transition spans for HCT done in future • All other HCT improvements done in future	**Trans-Lake:** • No roadway design implications for Trans-Lake
Design Flexibility for HCT	**Future HCT:** • High flexibility vs. Scenario 1 because only floating bridge pontoons are provided for • Allows for different alignment choices off the bridge	**Future HCT:** • Future design opportunities are very flexible
Ease of Implementation of Future HCT in SR 520 Corridor	**Future HCT:** Moderately difficult to implement due to following elements of work: • Floating bridge approach spans will need to be widened • 84th Avenue NE and 92nd Avenue NE lids will need to be widened • Roadway and possible retaining walls between EPR lid and 84th Avenue NE will have to be reconstructed • Points Community HCT station cut–and-cover tunnel under loop ramp will need to be constructed, resulting in traffic disruptions	**Future HCT:** • Moderately difficult to implement HCT alignment in the future because future cut-and-cover tunnel construction in vicinity of NE 51st Street and other structures near Union Hill Road will present significant disruptions to highway traffic
Cost Implications	**Trans-Lake:** • $116 million – see Chapter 7 for cost elements	**Trans-Lake:** • No additional cost – see Chapter 7 for cost elements
	Future HCT: • $571 million – see Chapter 7 for cost elements	**Future HCT:** • $147 million - see Chapter 7 for cost elements

6.3.1 Floating Bridge

In this "minimal" scenario for HCT accommodation, the floating bridge pontoons and bridge substructure would be modified to support a future HCT line across Lake Washington. The initial floating bridge deck lane configuration would be the same as for Scenario 1, but would be designed to allow future widening for HCT.

6.3.2 West Side Floating Bridge Approaches

On the west side of Lake Washington, it is assumed that the future HCT line would leave the highway median as quickly as possible after reaching the west side of the navigation channel (when traveling in a westerly direction). A transition length of approximately 1,800 feet on the west approach would be necessary to allow the HCT alignment to leave the highway median and cross over the highway lanes with a minimum 16.5-foot clearance.

The approach structure would have to be widened and modified over this transition length when HCT is implemented in the future to allow for additional width. As part of this scenario, the foundation of the approach span would be designed to accommodate HCT as part of the initial highway project because retrofitting foundations is extremely difficult.

Once the HCT alignment leaves the highway envelope, no additional highway design or ROW modifications would be required. The HCT line would touchdown in the Montlake area and change configuration to a bored tunnel. The HCT line could then turn north to the University District or south to downtown Seattle.

6.3.3 East Side Floating Bridge Approaches

On the east side of Lake Washington, the highway climbs up the east approach structure at a 3 percent grade and approaches EPR, which is located at the top of the grade. Assuming a maximum climbing grade of 6 percent for the HCT line, it would not be physically possible for the HCT line to shift out of the highway median west of Evergreen Point Road before encountering the proposed Evergreen Point Road structure/lid. Therefore, the east approach structure would have to be widened and modified over its entire length when HCT is implemented.

The foundations of the approach span need to be designed to accommodate HCT as part of the initial highway project because retrofit of structure foundations is extremely difficult.

6.3.4 Evergreen Point Road Lid

The HCT line has been assumed to travel under the EPR lid per the HCT definition discussed earlier in this report. There are two options to accommodate the HCT line under the lid as noted below.

6.3.4.1 Option A

This option assumes that the EPR BRT station could be displaced. In this option, the HCT envelope is assumed to fit within the footprint of the BRT station proposed under the Evergreen Point lid, so no additional ROW would be required and the lid would not have to be widened for HCT.

The lid will have to be designed carefully to ensure no conflicts between support walls/columns and the future HCT line. A construction staging area for the HCT line under the EPR lid would be very limited and could require some highway travel lane closures.

6.3.4.2 Option B

The second option for the EPR lid assumes that the BRT station cannot be displaced when the future HCT line is constructed. In this option, the HCT envelope must be provided in the middle of the BRT station (i.e., the footprint of the BRT station must be wider to allow the HCT line to pass between the two BRT platforms and bus bypass lanes).

Such a configuration would require initial construction of a wider (possibly 30 to 40 feet) EPR lid. A construction staging area for the HCT line under the Evergreen Point lid would be very limited and could require some BRT station and/or highway travel lane closures.

This option is used in the cost analysis.

6.3.5 East of Evergreen Point Road Lid

For purposes of this discussion, the remainder of the HCT corridor is described below; however, Scenario 2 would not include any changes to proposed highway structures east of EPR.

Just east of the EPR lid (and traveling east), it is assumed that the HCT line would transition as quickly as possible out of the highway median. The distance required for the HCT to transition out of the roadway to the north side of SR 520 is approximately 1,600 feet. This would require a full-width HCT footprint for about 1,000 feet, after which the footprint could narrow to accommodate columns and other support structures.

The additional width in the highway median for HCT would be developed at the time of the HCT construction and would require additional ROW acquisition on either side of SR 520. It would also require reconstruction of the highway mainline and possible reconstruction of retaining walls. It will be important to choose an initial highway alignment design that minimizes/balances the ultimate combined impacts of both the Trans-Lake Washington Project and the HCT line project between the EPR lid and 84th Avenue NE.

Once the HCT line has transitioned to the north side of SR 520, it would continue east along the edge of the highway and under the 84th Avenue NE lid through a cut-and-cover structure that goes under the westbound loop ramp. No accommodation for the HCT line would be made at the 84th Avenue NE lid. The cut-and-cover tunnel under the westbound loop ramp would not be part

of the initial highway construction and would be deferred until construction of the HCT improvements.

The HCT line would continue to the proposed Points Community HCT station located in the northeast quadrant of the 84th Avenue NE interchange.

That portion of the HCT station footprint outside of the future highway ROW would not be acquired at the time of highway construction. If this scenario is chosen, further HCT planning and design work would be necessary to confirm the location of the Points Community HCT station and the size of the footprint before finalizing the ROW requirements and lid design at 84th Avenue NE.

East of 84th Avenue NE, the HCT line is expected to be outside of the SR 520 ROW, passing adjacent to the 92nd Avenue NE lid. East of 92nd Avenue NE (heading in an easterly direction), the HCT line will continue to follow the north side of SR 520, eventually turning north to serve the proposed South Kirkland park-and-ride HCT station. The additional ROW required for HCT would not be acquired under this scenario.

The proposed SR 520 bicycle/pedestrian path and the Points Loop Trail between EPR and 92nd Avenue NE may have to be reconstructed in several locations at the time of HCT construction.

6.3.6 Vicinity of I-405

The HCT alignment would follow the BNSF rail alignment from the vicinity of the South Kirkland park-and-ride lot through the I-405 interchange. A transit transfer station would be located on the east side of the I-405 interchange. The HCT alignment would continue through a 1,200-foot cut-and-cover structure to reach the HCT alignment east of 124th, where it would join the future I-90 light rail alignment between Bellevue and Redmond on the south side of SR 520.

In Scenario 2, the cut-and-cover tunnel would not be constructed as part of the initial highway project. The undercrossing could cause major traffic disruptions during construction of the HCT line.

6.4 SCENARIO 3: HCT ACCOMMODATION ON ENTIRE LAKE CROSSING AND AT KEY STRUCTURES

Scenario 3 is similar to Scenario 2; however, it includes making additional accommodation adjustments to key structures east of the Evergreen Point lid. The accommodation of HCT is integral to the roadway design in this scenario of the Trans-Lake Washington Project. A summary of the implications of Scenario 3 are included in Table 6-3; a schematic of this scenario is shown in Appendix C.

Table 6-3. Scenario 3 - HCT Accommodation on Entire Lake Crossing and at Key Structures

	Montlake to 124th	124th to Redmond
Environmental Documentation Implications	**Trans-Lake:** • Wider pontoons and construction of approaches in "spread" location should not complicate EIS • EIS documentation in vicinity of EPR may be difficult for EPR lid Option B due to 4F (park) impacts • Cut-and-cover tunnel under westbound loop ramp at 84th Avenue NE will require stormwater treatment facility in current conceptual design to be vaulted within the roadway prism or to be constructed in an alternate location • Other structural modifications such as cut-and-cover structure east of I-405 will not complicate the EIS	**Trans-Lake:** • Minimal implications to Trans-Lake EIS
	Future HCT: • The future EIS will need to cover all HCT planned improvements not provided for by the initial highway project	**Future HCT:** • The future EIS will need to cover all HCT planned improvements not provided for by the initial highway project
ROW Implications	**Trans-Lake:** • Will have to acquire additional ROW in vicinity of EPR lid for Option B. This may be difficult due to NEPA requirements • Additional ROW is likely required if stormwater treatment facility is relocated	**Trans-Lake:** • No effect on this part of the project
	Future HCT: • Except for EPR lid vicinity and possibly stormwater treatment facility, all ROW needed for HCT will be acquired at a future time	**Future HCT:** • All ROW needed for HCT will need to be acquired at a future time
Roadway Design Implications for Trans-Lake Washington Project	**Trans-Lake:** • Floating bridge pontoons and substructure will be designed to support roadway deck plus a deck for future HCT that could be built at a later time • Approach span structures will be designed in "spread" location to facilitate building HCT superstructure without rebuilding of the roadway portion of the structures • EPR lid Option A will take some preliminary design work to ensure that there are no conflicts with adding HCT in the future • EPR lid Option B will require that the lid be designed wide enough for future HCT • Cut-and-cover tunnel in vicinity of 84th Avenue NE westbound on-ramp will need to be designed and constructed • 84th Ave NE lid will need to be designed so it can be widened in the future by adding another span to the north • 92nd Ave NE lid will need to be designed so it can be widened in the future by adding another span to the north • I-405 interchange will be designed to allow room for HCT transfer station • Cut-and-cover tunnel east of I-405 will need to be designed and constructed • Floating bridge superstructure and deck for HCT designed in future • All other HCT improvements done in future	**Trans-Lake:** • If the 8-lane alternative is chosen as the preferred alternative, investigation should be done to see if overall savings can be realized by constructing the cut-and-cover tunnel north of the Overlake transit center during the construction of the braided ramps at NE 51st Street • Conceptual design of the HCT alignment should be done in the vicinity of Union Hill road to ensure roadway design does not preclude HCT

	Montlake to 124th	124th to Redmond
Design Flexibility for HCT	**Future HCT:** • Moderate flexibility because the floating bridge, approach structures, EPR lid, and cut-and-cover tunnel at 84th Avenue NE are fixed. Cut-and-cover tunnel east of I-405 also has fixed location • Some risk of throw-away costs with these investments if different alignments are chosen in the future	**Future HCT:** • High flexibility for future HCT
Ease of Implementation of Future HCT in SR 520 Corridor	**Future HCT:** Moderately difficult to implement due to following elements of work: • Superstructure and deck for HCT will be added to the floating bridge • Even though roadway has been constructed in a "spread" configuration, columns, superstructure, and decking will need to be added to the approach structures for HCT (roadway structures will not need to be reconstructed) • 84th Avenue NE and 92nd Avenue NE lids will need to be widened by adding spans to the north • Roadway and possible retaining walls between EPL and 84th Avenue NE will have to be reconstructed • Potential cost throw-away of cut-and-cover undercrossing just east of I-405 interchange	**Future HCT:** • Selection of future HCT alignment in this area remains flexible
Cost Implications	**Trans-Lake:** • $190 million – see Chapter 7 for cost elements	**Trans-Lake:** • No added cost
	Future HCT: • $426 million – see Chapter 7 for cost elements	**Future HCT:** • $141 million – see Chapter 7 for cost elements

6.4.1 Floating Bridge

The design and construction of the floating bridge pontoons and substructure would be modified at the time of the initial highway construction to support a future HCT line across the lake. The initial floating bridge deck lane configuration would be the same as for Scenario 2.

6.4.2 West Side Floating Bridge Approaches

On the west side of the lake, the HCT envelope would be as described for Scenario 2. However, the difference between this scenario and Scenario 2 is that the approaches would be constructed in their ultimate "spread" location and the structural elements would be designed so the HCT superstructure could be added at a later time without requiring reconstruction of the roadway or approach support structures.

6.4.3 East Side Floating Bridge Approaches

As with Scenario 2, the east approach structure for the roadway would be constructed in the "spread" position, and would be modified over its entire length to eventually accommodate HCT in the center. The difference between this scenario and Scenario 2 is the design modifications for the east approach structure would be implemented as part of the initial highway project. The structural elements would be designed so the HCT superstructure could be added at a later time and no future reconstruction of the roadway or support structures would be required.

6.4.4 Evergreen Point Road Lid

On the east side of the lake, the HCT line is assumed to remain in the highway median and pass under the EPR lid. As with Scenario 2, there are two options to accommodate HCT under the EPR lid.

The first option assumes that displacing the BRT station is feasible (this option does not require a wider lid, but would require careful lid design to ensure no future conflicts with HCT would arise). The second option would place the HCT line in the middle of the BRT station (which would require a wider lid design and ROW acquisition of approximately 30 to 40 feet). With the second option, the initial highway construction would take the wider lid into account.

6.4.5 East of Evergreen Point Road Lid

East of the EPR lid, it is assumed that the HCT envelope would transition out of the highway median and ROW and continue as described in the definition of the HCT alignment.

As noted for Scenario 2, there are significant space requirements for the HCT to transition from the center to the outside of the highway. The acquisition of additional ROW and reconstruction of the highway mainline to achieve an adequate transition length would occur at the time of HCT implementation.

Once the HCT line has transitioned to the north side of SR 520, it would continue east along the edge of the highway and under the 84th Avenue NE lid. The lid at 84th Avenue NE would be built under the Trans-Lake Washington Project without the extra width; however, the lid would be designed and constructed such that adding another span farther north could be accommodated. The cut-and-cover tunnel under the northbound-to-westbound loop ramp would be part of the initial highway construction.

The Points Community HCT station is assumed to be outside the 84th Avenue NE lid in the northeast quadrant of the interchange. That portion of the HCT station footprint outside of the future highway ROW would not be acquired at the time of the highway construction. If this scenario is chosen, further HCT planning and design work should be pursued to confirm the location of the Points Community HCT station and the size of the footprint before finalizing the ROW requirements and the lid design at 84th Avenue.

Under Scenario 3, a stormwater treatment facility planned (conceptually) in the northeast quadrant of the interchange for the initial highway project would need to be constructed in the roadway prism as a vault system or as treatment ponds in another location that would require additional ROW elsewhere.

Continuing east from the Points Community HCT station, it is assumed that the HCT envelope would continue on the north side of SR 520 and pass under the 92nd Avenue NE lid on the north side of the travel lanes. Crossing under 92nd Avenue at this location is preferred over the highway median location since the HCT is already on the north side of SR 520 and will eventually leave the corridor on the north side in the vicinity of Bellevue Way.

The 92nd Avenue NE lid structure would not initially be built with an HCT envelope, but the lid would be designed and constructed such that adding another span farther north could be accommodated.

East of 92nd Avenue NE, it is assumed the HCT alignment would be on the north side of SR 520 and, at some point, the alignment would diverge from the highway corridor to access the South Kirkland park-and-ride. Therefore, east of the 92nd Avenue NE lid, no design modifications or ROW changes would be necessary to accommodate HCT in this scenario.

HCT construction staging space under the EPR and the 92nd Avenue NE lids would probably be very limited and could require some highway travel lane closures. Also, the proposed SR 520 bicycle/pedestrian path and the Points Loop Trail between EPR and 124th Avenue NE may have to be reconstructed in several locations at the time of HCT construction.

6.4.6 Vicinity of I-405

The HCT alignment in the vicinity of I-405 is the same as described for Scenario 2.

The interchange itself would have to be carefully designed and constructed to ensure no future conflicts would arise between the HCT station and the HCT line that passes through the interchange.

The shallow 1,200-foot-long cut-and-cover tunnel undercrossing of SR 520 would be constructed as part of the initial highway project to avoid major traffic disruption during construction of the HCT line.

6.4.7 NE 124th to Redmond

Although the definition of Scenario 3 includes accommodation of HCT in the design and construction of major structures, it is not clear what the implications are for the cut-and-cover tunnel in the vicinity of NE 51st Street.

The 6-lane alternative will not be constructing roadway improvements in this area so the construction of the tunnel becomes more of a "build it now" or "build it later" question.

Further investigation of the possible construction of the cut-and-cover tunnel would be necessary if the 8-lane alternative were chosen because that alternative includes rebuilding portions of the NE 40th Street and NE 51st Street interchanges. Investigating the staging of the cut-and-cover HCT tunnel at the same time as the ramps in the vicinity of NE 51st should be considered.

Another accommodation issue would include preliminary conceptual design work for the HCT crossing at the intersection at SR 520/NE Union Hill Road. Roadway design would ensure the HCT line crossing SR 520 would not be precluded.

6.5 SCENARIO 4: HCT ENVELOPE PRESERVATION ON FULL CORRIDOR

Scenario 4 would go the furthest to provide for future HCT development. In this scenario, the initial highway project would be constructed to allow a full HCT envelope between Montlake Boulevard in Seattle and the Redmond terminus, where it is within the SR 520 corridor as described the HCT alignment definition.

The intent of Scenario 4 is to provide for highway travel lanes that would be constructed in their ultimate location so the floating bridge, the approach spans, the lids, and the SR 520 roadway would not need to be reconstructed when HCT is implemented in the future.

All ROW for the future HCT line, when it is located within or adjacent to SR 520, would be acquired at the time of the highway project, including the ROW for the Points Community HCT station.

Scenario 4 requires that the highway and HCT envelope design be closely coordinated to optimize both alignments concurrently and to minimize overall impacts for the combined projects. This scenario requires significantly more planning and design work to better define the HCT alignment and station locations.

A summary of the implications of Scenario 4 are included in Table 6-4; a schematic of this scenario is shown in Appendix D.

6.5.1 Floating Bridge

The floating bridge would be constructed as part of the Trans Lake Washington Project with pontoons, substructure, and deck ready to support a future HCT line with no further structural improvements. No future widening or reconstruction of any portion of the floating bridge would be required at the time of HCT implementation.

6.5.2 West Side Floating Bridge Approaches

6.5.2.1 Option A

On the west side of the lake, it is assumed that the HCT envelope would remain in the highway median west of the floating bridge. This would require design modifications to the west approach structure, the ramps to Lake Washington Boulevard, and possibly the mainline highway footprint as part of the initial highway project. Just east of the proposed Montlake lid, the HCT line would descend into a tunnel configuration within the highway median. This tunnel would either turn northward to serve the University District or southward to downtown Seattle. In this option, the Montlake BRT station under the Montlake lid would be displaced.

Table 6-4. HCT Envelope Preservation on Full Corridor

	Montlake to 124th	124th to Redmond
Environmental Documentation Implications	**Trans-Lake:** • Trans-Lake EIS will address roadway and HCT alignment in one document. This may present complications, so FHWA, FTA staff, and legal council should be consulted regarding restrictions and nuances of the NEPA process • Environmental document would likely need to address HCT alignment alternatives and cumulative impacts of both projects	**Trans-Lake:** • Trans-Lake EIS will address roadway and HCT alignment in one document. This may present complications, so FHWA, FTA staff, and legal council should be consulted regarding restrictions and nuances of the NEPA process • Environmental document would likely need to address HCT alignment alternatives and cumulative impacts of both projects
	Future HCT • Will need to deal with environmental documentation for trackage and operations issues only	**Future HCT** • Will need to deal with environmental documentation for trackage and operations issues only
ROW Implications	**Trans-Lake:** • Trans-Lake project will acquire all corridor ROW; this may include 4F ROW	**Trans-Lake:** • Trans-Lake project will acquire all corridor ROW
	Future HCT • SR 520 ROW will have been acquired • All ROW needed for HCT outside the SR 520 corridor will need to be acquired at a future time	**Future HCT** • SR 520 ROW will have been acquired • All ROW needed for HCT outside the SR 520 corridor will need to be acquired at a future time
Roadway Design Implications for Trans-Lake Washington Project/	**Trans-Lake:** • Entire roadway and HCT corridor will need to be designed as an integrated system	**Trans-Lake:** • Entire roadway and HCT corridor will need to be designed as an integrated system
Design Flexibility for Future HCT	**Future HCT** • Low Flexibility • This scenario will not allow flexibility since there will have been a signification investment in the SR 520 corridor that would become throwaway	**Future HCT** • Low Flexibility • This scenario will not allow flexibility since there will have been a signification investment in the SR 520 corridor that would become throwaway
Ease of Implementation of Future HCT in SR 520 Corridor	**Future HCT** • This scenario is optimal for future HCT	**Future HCT** • This scenario is optimal for future HCT
Cost Implications	**Trans-Lake:** • $601 million – see Chapter 7	**Trans-Lake:** • $141 million – see Chapter 7
	Future HCT • No added cost related to moving the roadway, buying ROW, or major structural modifications • Future HCT will still have costs associated with some retaining wall trackbed and other HCT systems.	**Future HCT** • No added cost related to moving the roadway, buying ROW, or major structural modifications • Future HCT will still have costs associated with some retaining wall trackbed and other HCT systems.

6.5.2.2 Option B

To avoid displacement of the Montlake BRT station, transition from cut-and-cover to a bored tunnel configuration would have to occur east of Montlake Boulevard to allow the HCT alignment to descend below the BRT station with adequate clearance. Option B is only feasible if there is no highway tunnel connection from SR 520 to the Pacific/Montlake intersection.

6.5.2.3 Option C

If avoiding displacement of the Montlake BRT station as described under Option B above were not feasible, the footprint of the highway ROW and lid through Montlake would have to be significantly widened to accommodate both a BRT station and a tunnel portal under Montlake Boulevard.

6.5.3 East Side Floating Bridge Approaches

The difference between this scenario and Scenario 3 is the design modifications for the east approach structure would be implemented as part of the initial highway project, such that no future reconstruction would be required.

6.5.4 Evergreen Point Road Lid

On the east side of the lake, the HCT alignment is assumed to be located under EPR lid. As with Scenarios 2 and 3, there are two options for placement of the HCT envelope; the choice of option will depend on whether displacement of the Evergreen Point BRT station is feasible. An option will need to be chosen and implemented as a part of the initial construction of the highway.

6.5.5 East of Evergreen Point Road Lid

East of the EPR lid between EPR and 84th Avenue, the HCT alignment would be the same as that described for Scenario 3. The difference between this scenario and Scenario 3 is initial highway design, construction, and acquisition would take into account later HCT construction so that future highway reconstruction or acquisition would not be necessary. This would require that the lid at 84th Avenue NE be built to full width to accommodate HCT. It would also require construction of the cut-and-cover structure at the westbound loop ramp and the retaining walls for the Points Community HCT station.

Another key difference between this scenario and Scenario 3 is that all ROW required to accommodate a future HCT line (whether parallel to or in the SR 520 envelope) would be acquired at the same time as the highway ROW acquisition. This would require 30 to 40 feet more ROW than Scenario 1.

To achieve this scenario, the location and footprint of the Points Community HCT station at 84th Avenue NE would have to be well defined at the time of highway design and construction.

Similar to Scenario 3, the stormwater treatment facility proposed in the northeast quadrant of the interchange would be located in vaults within the roadway prism or constructed elsewhere as treatment ponds that require additional ROW.

At the 92nd Avenue NE lid an HCT envelope would be located under the lid directly adjacent to the westbound highway travel lanes. The BRT station could remain (which would require a wider lid but not a wider highway median), or the BRT station could be displaced by the westbound highway lanes shifting southward under the lid to accommodate HCT without widening the lid. For costing purposes it has been assumed that the HCT envelope would not displace the BRT station.

East of the 92nd Avenue NE lid, the HCT line would continue eastward on the north side of SR 520 parallel to the highway lanes. The HCT alignment would continue in this location to a point just west of Lake Washington Boulevard, where the HCT alignment would diverge to serve the South Kirkland park-and-ride. ROW for this length of the HCT envelope would be acquired at the same time as the highway ROW acquisition. The initial highway design and acquisition should minimize overall impacts of the combined project. This would require a significant HCT design effort as part of the highway design work.

The proposed SR 520 bicycle/pedestrian path and the Points Loop Trail between EPR and 124th Avenue NE would be reconstructed in its final location for significant portions of its length.

6.5.6 Vicinity of I-405

The HCT alignment in the vicinity of I-405 is the same as described in Scenario 2.

In Scenario 4, the interchange and the HCT envelope (including the cut and cover tunnel) will be designed and constructed as an integrated package.

East of the undercrossing, all ROW necessary to construct the HCT line on the south side of SR 520 between I-405 and 124th Avenue NE would be acquired as part of the initial highway acquisition.

6.5.7 NE 124th to Redmond

The alignment and design/construction modifications at the two crossing locations (as described above for Scenario 3) would be part of Scenario 4. Property acquisition for the HCT alignment where it parallels the highway ROW would be part of the initial highway project.

7. COST EVALUATION AND IMPLICATIONS

There are several methods that can be used to compare alternative costs. The methods include:

- Present Value Analysis – This allows a simple comparison of alternative expenditures without the concern for interest rate, revenue, or time in which expenditures, revenues, and benefits occur.

- Year of Expenditure Analysis – This method is often used when evaluating revenues and expenditures to assure project cash flow is adequate and to cause less confusion to legislative bodies and the press about the total expenditures for public projects.

Because this paper is attempting to address the overall question of the level of investment—near future vs. distant future—the present value approach provides a simple analysis tool. There has been no effort to quantify benefits of an investment or to quantify benefit/cost for the scenarios.

7.1 ELEMENTS CONSIDERED IN COST ESTIMATE

Table 7-1 outlines the elements considered in developing costs for initial highway construction that provide the level of accommodation as provided in the scenario definition.

Table 7-2 outlines the elements considered in developing future HCT costs.

Table 7-1. General Assumption for Developing Cost for HCT During Initial Highway Construction

Scenario 1: No HCT Accommodation (Baseline Scenario)	Scenario 2: HCT Accommodation on Floating Bridge	Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures	Scenario 4: HCT Envelope for Full Corridor
HCT Corridor • No Accommodation	Floating Bridge • Install floating bridge substructure	Floating Bridge • Install floating bridge substructure	Floating Bridge • Install substructure and superstructure
	Approach Structures • Assume future widening • Design the stormwater facilities that collect runoff from west approach structures to accommodate future HCT	Approach Structures • Leave gap in approaches for future structure • Design the stormwater facilities that collect runoff from west approach structures to accommodate future HCT	Approach Structures • Build HCT approach structures • Design the stormwater facilities that collect runoff from west approach structures to accommodate future HCT
	Evergreen Point Road • Option A (Design Issue No Cost) • Option B - widening lid structure for future HCT (used for scenario cost development)	Evergreen Point Road • Option A (Design Issue No Cost) • Option B - widening lid structure for future HCT (used for scenario cost development)	Evergreen Point Road • Option A (Design Issue No Cost) • Option B - widening lid structure for future HCT (used for scenario cost development)
	84th Avenue • No design accommodation	84th Avenue • Design lid to accommodate expansion • Build cut-and-cover structure at ramp • Build detention vaults outside of expansion area rather than wetpond inside the loop ramp • Assume that stormwater vault between 84th and 92nd will be designed to accommodate HCT	84th Avenue • Build lid expansion • Build cut-and-cover structure at ramp • Build detention vaults outside of expansion area rather than wetpond inside the loop ramp • Assume that stormwater vault between 84th and 92nd will be designed to accommodate HCT • Buy ROW for transition from south to north side from Evergreen Point to 84th
	92nd Avenue • No design accommodation	92nd Avenue • Design lid to accommodate expansion	92nd Avenue • Build lid expansion

Scenario 1: No HCT Accommodation (Baseline Scenario)	Scenario 2: HCT Accommodation on Floating Bridge	Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures	Scenario 4: HCT Envelope for Full Corridor
	I-405 • No accommodation	I-405 • Build 1,200-foot cut-and-cover under SR 520 • Assume that stormwater vault in vicinity of 130th Ave NE will be designed to accommodate HCT	I-405 • Build 1200-foot cut-and-cover under SR 520 • Assume that stormwater vault in vicinity of 130th Ave NE will be designed to accommodate HCT
	51st • No accommodation	51st • For 6 lanes no accommodation (used for scenario cost development)	51st • Build cut-and-cover under SR 520
	Redmond • No accommodation	Redmond • Design for future HCT	Redmond • Design for future HCT
	ROW • Purchase ROW only where necessary for accommodations listed above	ROW • Purchase ROW only where necessary for accommodations listed above	ROW • Buy all ROW in SR 520 corridor for HCT route

Table 7-2. General Assumptions for Developing Future HCT Costs

Scenario 1: No HCT Accommodation (Baseline Scenario)	Scenario 2: HCT Accommodation on Floating Bridge	Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures	Scenario 4: HCT Envelope for Full Corridor
Floating Bridge • Assume floating bridge is expandable	Floating Bridge • Build superstructure for floating bridge	Floating Bridge • Build superstructure for floating bridge	HCT Corridor • No work
Approach Structures • Assume approach structures can be widened • The south highway alignment will be held for all options so that stormwater facility that collects runoff from approach structures does not need to be adjusted	Approach Structures • Widen approach structures	Approach Structures • Build approach structure	
Evergreen Point Lid • Option B - widen nonaccommodated lid structure	Evergreen Point Lid • Option B - widen nonaccommodated lid structure	Evergreen Point Lid • No work	
84th Avenue • Widen nonaccommodated lid structure • Build cut-and-cover structure at ramp • Build detention vaults outside of expansion area rather than wetpond inside the loop ramp • Assume that the stormwater vaults between 84th Ave NE and 92nd Ave NE do not have to be adjusted for the HCT corridor	84th Avenue • Widen nonaccommodated lid structure • Build cut-and-cover structure at ramp • Build detention vaults outside of expansion area rather than wetpond inside the loop ramp • Assume that the stormwater vaults between 84th Ave NE and 92nd Ave NE do not have to be adjusted for the HCT corridor	84th Avenue • Widen lid structure • Buy ROW for transition from south to north side from Evergreen Point to 84th	
92nd Avenue • Widen nonaccommodated lid structure	92nd Avenue • Widen nonaccommodated lid structure	92nd Avenue • Widen lid structure	
I-405 • Build 1200-foot cut-and-cover under SR 520 • Assume that the stormwater vault in	I-405 • Build 1,200-foot cut-and-cover under SR 520 • Assume that the stormwater vault in	I-405 • No work	

Scenario 1: No HCT Accommodation (Baseline Scenario)	Scenario 2: HCT Accommodation on Floating Bridge	Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures	Scenario 4: HCT Envelope for Full Corridor
vicinity of 130th Ave NE does not have to be adjusted for the HCT corridor	vicinity of 130th Ave NE does not have to be adjusted for the HCT corridor		
51st • Build cut-and-cover under SR 520	51st • Build cut-and-cover under SR 520	51st • Build cut and cover under 6-lane alternative • No work for 8-lane alternative	
Redmond • Assume HCT can fit in Redmond interchange design	Redmond • No work	Redmond • No work	
Right of Way • Buy all ROW in SR 520 corridor for HCT route	Right of Way • Buy all ROW in SR 520 corridor for HCT route not previously purchased	Right of Way • Buy all ROW in SR 520 corridor for HCT route not previously purchased	

7.2 COST DEVELOPMENT METHODOLOGY

7.2.1 Construction Cost

Construction costs include the costs incurred to accommodate HCT in the SR 520 corridor as part of the initial highway construction. These costs include bridge modifications, tunnels, lids, reconstruction of the highway when necessary, traffic control, staging, and construction administration. These costs are calculated using the cost methodology submitted and approved by the CEVP team in April 2002. The cost opinion does not include the future implementation cost of the HCT system including such items as the guideway, power/electrical system, vehicles, stations, or maintenance bases.

7.2.2 Design Cost

Preliminary design costs are calculated as a percentage of the construction costs. This percentage varies between 5% and 15% based on the type of construction and is consistent with the CEVP methodology. If a structure needs to be modified during initial construction to allow for future HCT, the preliminary engineering is brought forward to reflect a complete design.

7.2.3 EIS Cost

The environmental documentation costs are taken at 30 percent of the construction costs for the EIS.

7.2.4 ROW Cost

ROW costs are calculated on a square footage basis. At this level of analysis, individual parcels and their values have not been identified.

Because of the preliminary nature of this estimate, final project costs will vary from those shown. Final costs will depend on actual costs for labor, construction equipment, disposal, and materials, as well as surface and subsurface conditions, regulatory constraints and approach to corridor mitigation, labor productivity, competitive market conditions, final project scope, schedule, and other factors. The cost opinions developed are not sufficiently accurate to support the development of program budgets.

7.3 COST IMPLICATIONS

Table 7-3 presents a cost summary; Appendix E provides backup spreadsheet information.

Table 7-3. Cost Summary
($2002)

Scenario Description		Env Doc/Design Costs		ROW Costs		Construction		Subtotal		Subotals	Total Translake and HCT
		Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond		
Scenario 1: No HCT Accomodation	Translake	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,192
	Future HCT	$355	$36	$60	$48	$630	$63	$1,045	$147	$1,192	
Scenario 2: Accomodation on Floating Bridge	Translake	$30	$0	$2	$0	$84	$0	$116	$0	$116	$834
	Future HCT	$215	$36	$58	$48	$298	$63	$571	$147	$718	
Scenario 3: HCT Accomodation on Entire Lake Crossing and at Key Structures	Translake	$52	$0	$2	$0	$136	$0	$190	$0	$190	$757
	Future HCT	$162	$35	$58	$48	$206	$58	$426	$141	$567	
Scenario 4: HCT Envelope Preservation	Translake	$210	$35	$60	$48	$332	$58	$602	$141	$743	$743
	Future HCT	$0	$0	$0	$0	$0	$0	$0	$0	$0	

Note: Costs are in million dollars.

8. INVESTMENT TIMEFRAME IMPLICATIONS

Although cost benefits and the time value of project expenditures have not been quantified, policy makers must deal with the issue of benefits with respect to time and uncertainty as they relate to HCT in the SR 520 corridor.

Implementation of HCT in the entire SR 520 corridor is not anticipated within the next 20 years or even longer. This has a major implication because the benefit/cost of project expenditures would be lowered substantially considering the time value of the investment. Decision makers will need to compare the transportation benefits of this investment with other investments (expenditures) that could be made.

Another implication is making an investment in a facility that may be halfway through its service life when the benefits are finally realized. For instance, if the service life of the new Trans-Lake facility is 75 years and the benefit cannot be realized until half way through its service life, the effective benefit is reduced (because the benefit can only be realized over a limited time frame) and would need to be compared to making another investment.

Making an investment in the near term for benefits that will be realized in the future also must take future uncertainties into consideration. HCT technology may change and land use and commuting patterns may change. These uncertainties create a risk that the accommodation investments will not be compatible with future HCT implementation and that the expected value of the investment options is reduced. This risk factor must be included in the decision-making process.

9. LEGAL/PROCEDURAL ISSUES

Decision makers must have a clear understanding of several related issues before making decisions on the accommodation/preservation issue.

9.1 NATIONAL ENVIRONMENTAL POLICY ACT

Decision makers must understand the limits and nuances of what must and must not be included in a National Environmental Policy Act (NEPA) EIS because specific legal requirements must be met. An issue like this comes within the decision-making jurisdiction of FHWA and FTA, so both of these agencies should be consulted.

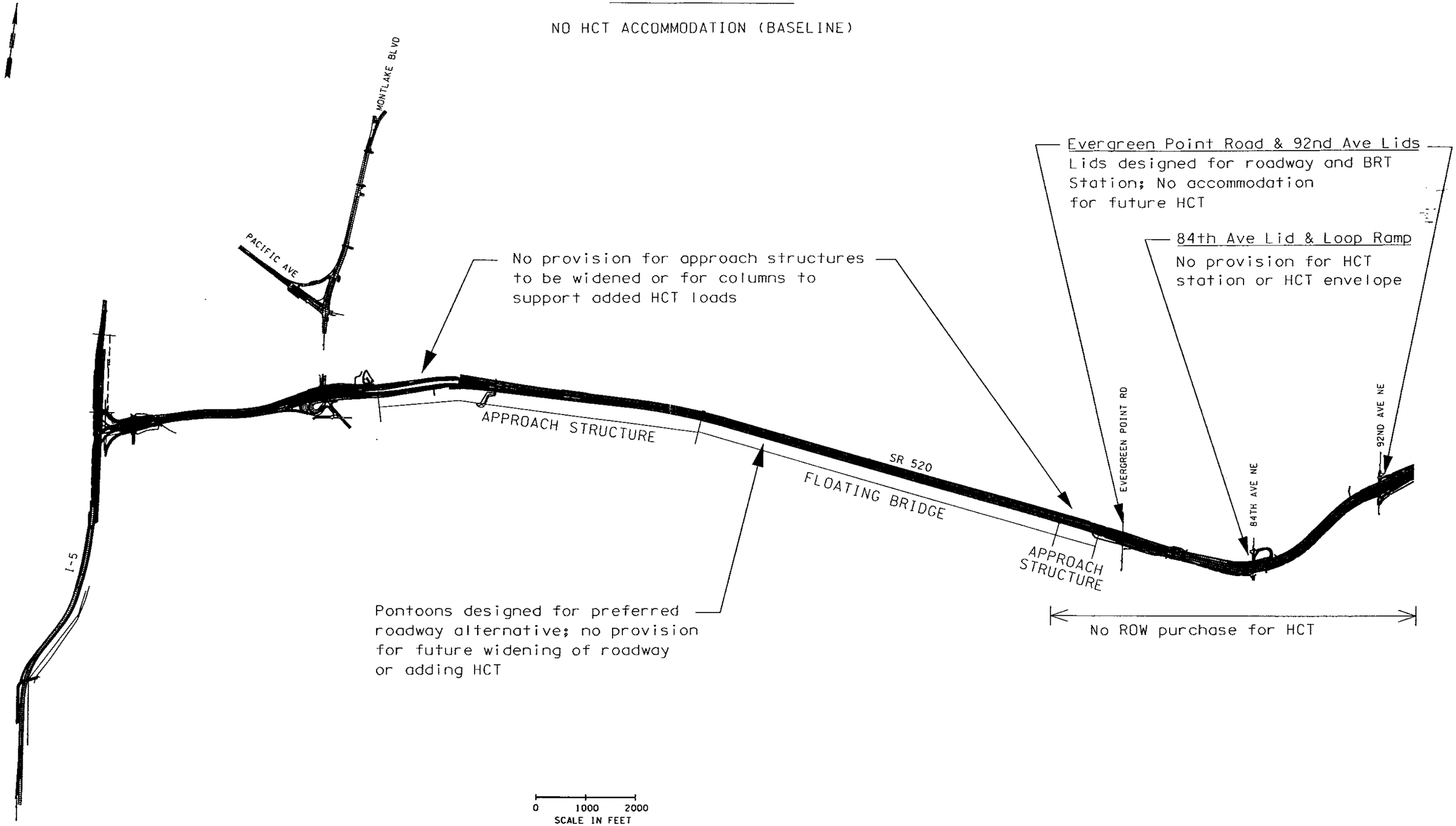
9.2 RIGHT OF WAY ACQUISITION

ROW acquisition through the use of eminent domain proceedings usually relies on a project being identified in a transportation plan or having a record of decision as the basis for demonstrating the public use and necessity requirement. This is the first step in condemnation proceedings. Decision makers must understand the limits and exceptions to this process. Legal counsel needs to be sought on whether ROW can be acquired for a speculative project for which no planning or environmental documentation has been done.

Appendix A – Schematic of Scenario 1

SCENARIO 1

NO HCT ACCOMMODATION (BASELINE)



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PROJ. ENGR.	L. RUBSTELLO
REGIONAL ADM.	D. DYE

REVISION	DATE	BY

REGION NO.	STATE	FED.AID PROJ.NO.
10	WASH	
JOB NUMBER		
CONTRACT NO.		LOCATION NO.

RANSIT

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SR 520
TRANS-LAKE WASHINGTON PROJECT

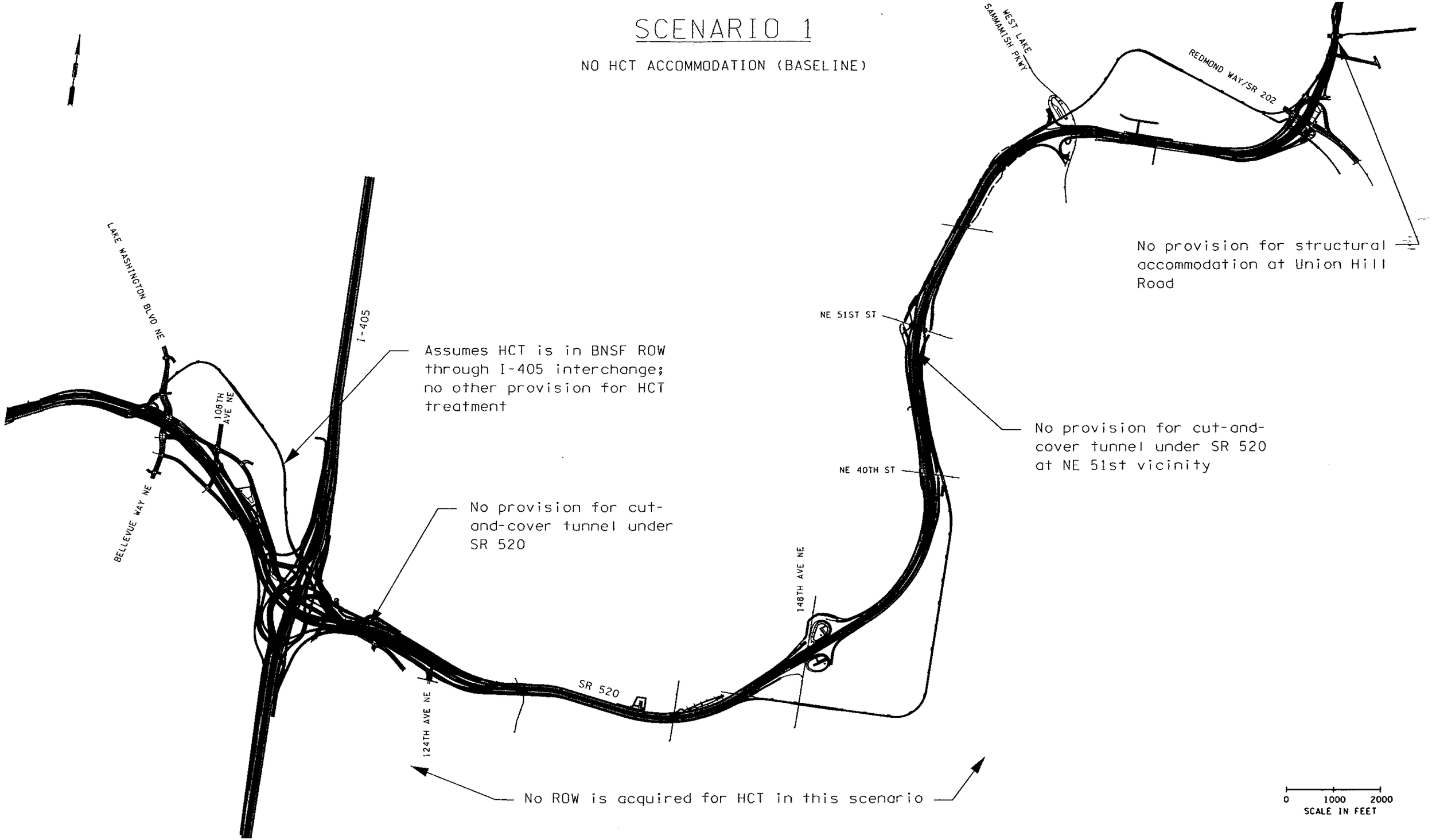
HCT ACCOMMODATION REPORT

PLOT1
HCT1

SHEET 1 OF 8 SHEETS

SCENARIO 1

NO HCT ACCOMMODATION (BASELINE)



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PROJ. ENGR.	L. RUBSTELLO
REGIONAL ADM.	D. DYE

REVISION	DATE	BY

REGION NO.	STATE	FED.AID PROJ.NO.
10	WASH	
JOB NUMBER		
CONTRACT NO.		LOCATION NO.

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SR 520
TRANS-LAKE WASHINGTON PROJECT

HCT ACCOMMODATION REPORT

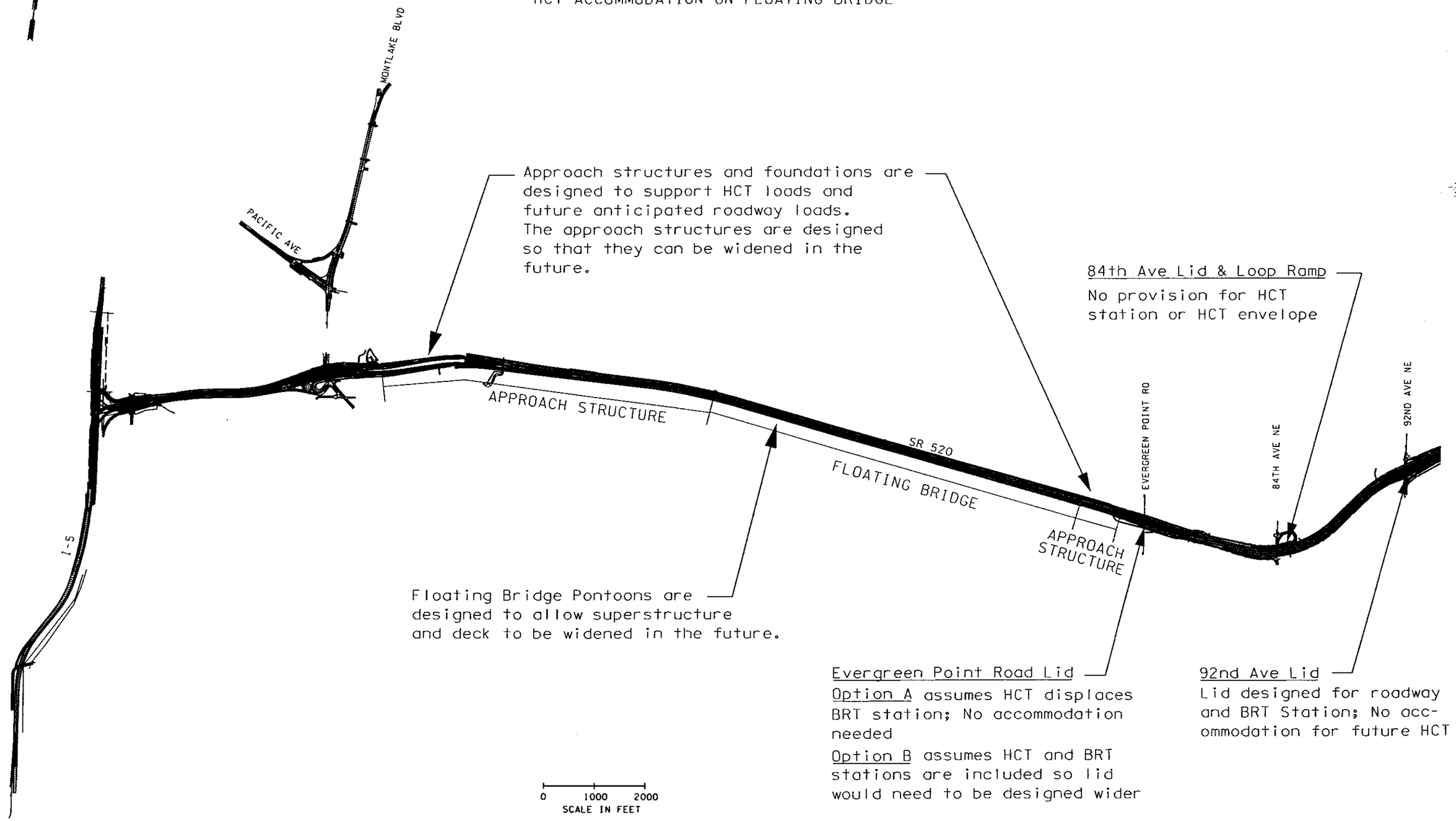
PLOT11
HCT2

SHEET 2 OF 8 SHEETS

Appendix B – Schematic of Scenario 2

SCENARIO 2

HCT ACCOMMODATION ON FLOATING BRIDGE



Approach structures and foundations are designed to support HCT loads and future anticipated roadway loads. The approach structures are designed so that they can be widened in the future.

84th Ave Lid & Loop Ramp

No provision for HCT station or HCT envelope

Floating Bridge Pontoons are designed to allow superstructure and deck to be widened in the future.

Evergreen Point Road Lid

Option A assumes HCT displaces BRT station; No accommodation needed

Option B assumes HCT and BRT stations are included so lid would need to be designed wider

92nd Ave Lid

Lid designed for roadway and BRT Station; No accommodation for future HCT

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REGIONAL ADM.	D. DYE

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REGION NO.	STATE	FED.AID PROJ.NO.
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JOB NUMBER		
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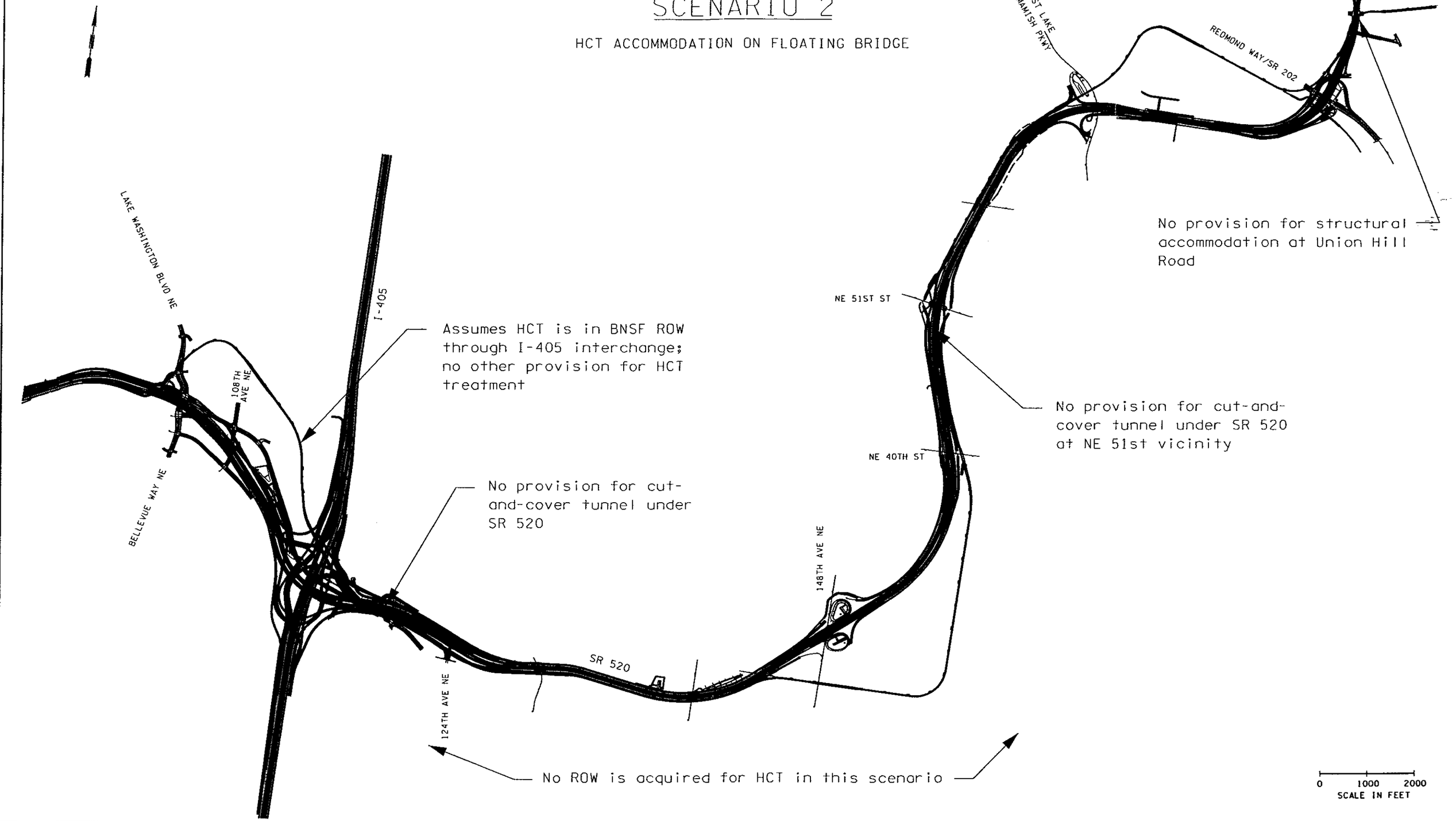
SR 520
TRANS-LAKE WASHINGTON PROJECT

HCT ACCOMMODATION REPORT

PLOT2
HCT3
SHEET 3 OF 8 SHEETS

SCENARIO 2

HCT ACCOMMODATION ON FLOATING BRIDGE



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DATE	08/22/2002				JOB NUMBER		
DESIGNED BY					CONTRACT NO.		LOCATION NO.
ENTERED BY	J. BRAUNS						
CHECKED BY	T. HAMSTRA						
PROJ. ENGR.	L. RUBSTELLO						
REGIONAL ADM.	D. DYE	REVISION	DATE	BY			

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SR 520
TRANS-LAKE WASHINGTON PROJECT

HCT ACCOMMODATION REPORT

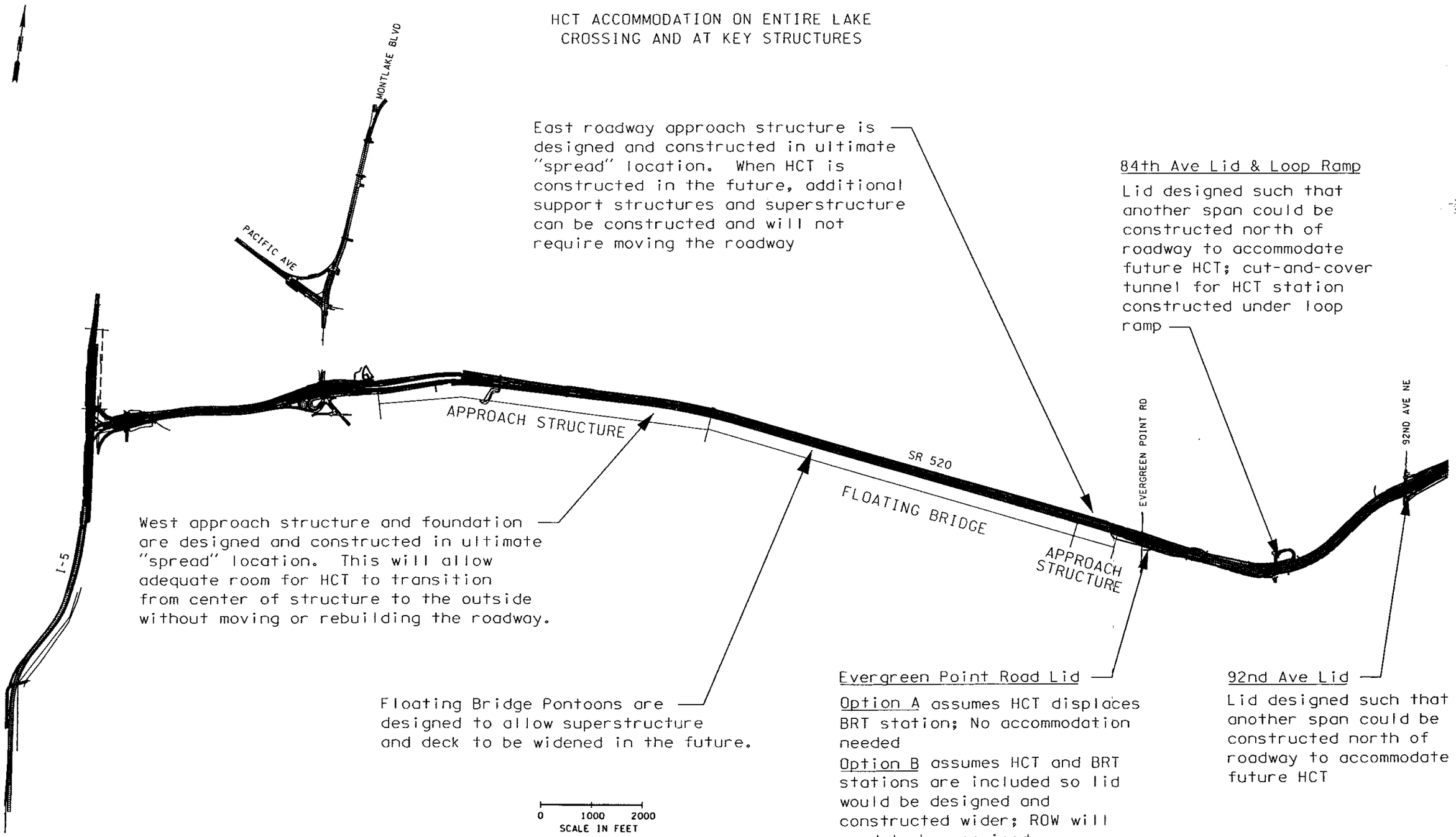
PLOT12
HCT4

SHEET 4 OF 8 SHEETS

Appendix C – Schematic of Scenario 3

SCENARIO 3

HCT ACCOMMODATION ON ENTIRE LAKE
CROSSING AND AT KEY STRUCTURES



East roadway approach structure is designed and constructed in ultimate "spread" location. When HCT is constructed in the future, additional support structures and superstructure can be constructed and will not require moving the roadway

West approach structure and foundation are designed and constructed in ultimate "spread" location. This will allow adequate room for HCT to transition from center of structure to the outside without moving or rebuilding the roadway.

Floating Bridge Pontoons are designed to allow superstructure and deck to be widened in the future.

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SCALE IN FEET

<u>84th Ave Lid & Loop Ramp</u>

Lid designed such that another span could be constructed north of roadway to accommodate future HCT; cut-and-cover tunnel for HCT station constructed under loop ramp

<u>Evergreen Point Road Lid</u>

<u>Option A</u> assumes HCT displaces BRT station; No accommodation needed

<u>Option B</u> assumes HCT and BRT stations are included so lid would be designed and constructed wider; ROW will need to be acquired

<u>92nd Ave Lid</u>

Lid designed such that another span could be constructed north of roadway to accommodate future HCT

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TIME	03:52:50 PM				10	WASH	
DATE	08/22/2002				JOB NUMBER		
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ENTERED BY	J. BRAUNS						
CHECKED BY	T. HAMSTRA						
PROJ. ENGR.	L. RUBSTELLO						
REGIONAL ADM.	D. DYE	REVISION	DATE	BY			

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HCT ACCOMMODATION REPORT

PLOT3
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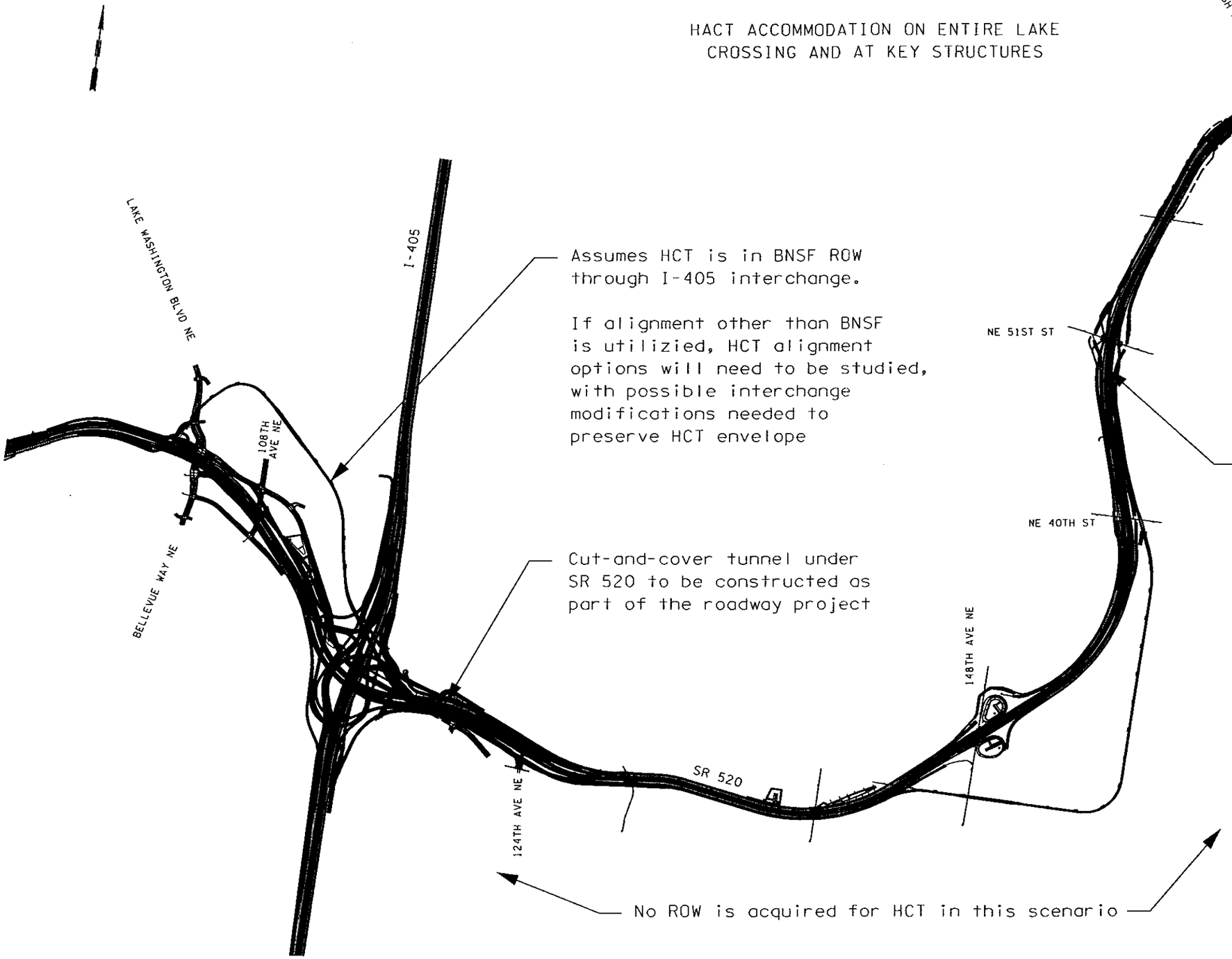
SCENARIO 3

HACT ACCOMMODATION ON ENTIRE LAKE
CROSSING AND AT KEY STRUCTURES



Assumes HCT is in BNSF ROW through I-405 interchange.

If alignment other than BNSF is utilizied, HCT alignment options will need to be studied, with possible interchange modifications needed to preserve HCT envelope

Cut-and-cover tunnel under SR 520 to be constructed as part of the roadway project

Roadway design should ensure HCT crossing at Union Hill Road is not precluded

If Alternative 4 (8-lanes) is selected the possibility of staging the cut-and-cover tunnel in the vicinity of NE 51st should be considered

No ROW is acquired for HCT in this scenario

0 1000 2000
SCALE IN FEET

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DATE	08/22/2002			CONTRACT NO.		LOCATION NO.
DESIGNED BY						
ENTERED BY	J. BRAUNS					
CHECKED BY	T. HAMSTRA					
PROJ. ENGR.	L. RUBSTELLO					
REGIONAL ADM.	D. DYE	REVISION	DATE	BY		

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SR 520
TRANS-LAKE WASHINGTON PROJECT

HCT ACCOMMODATION REPORT

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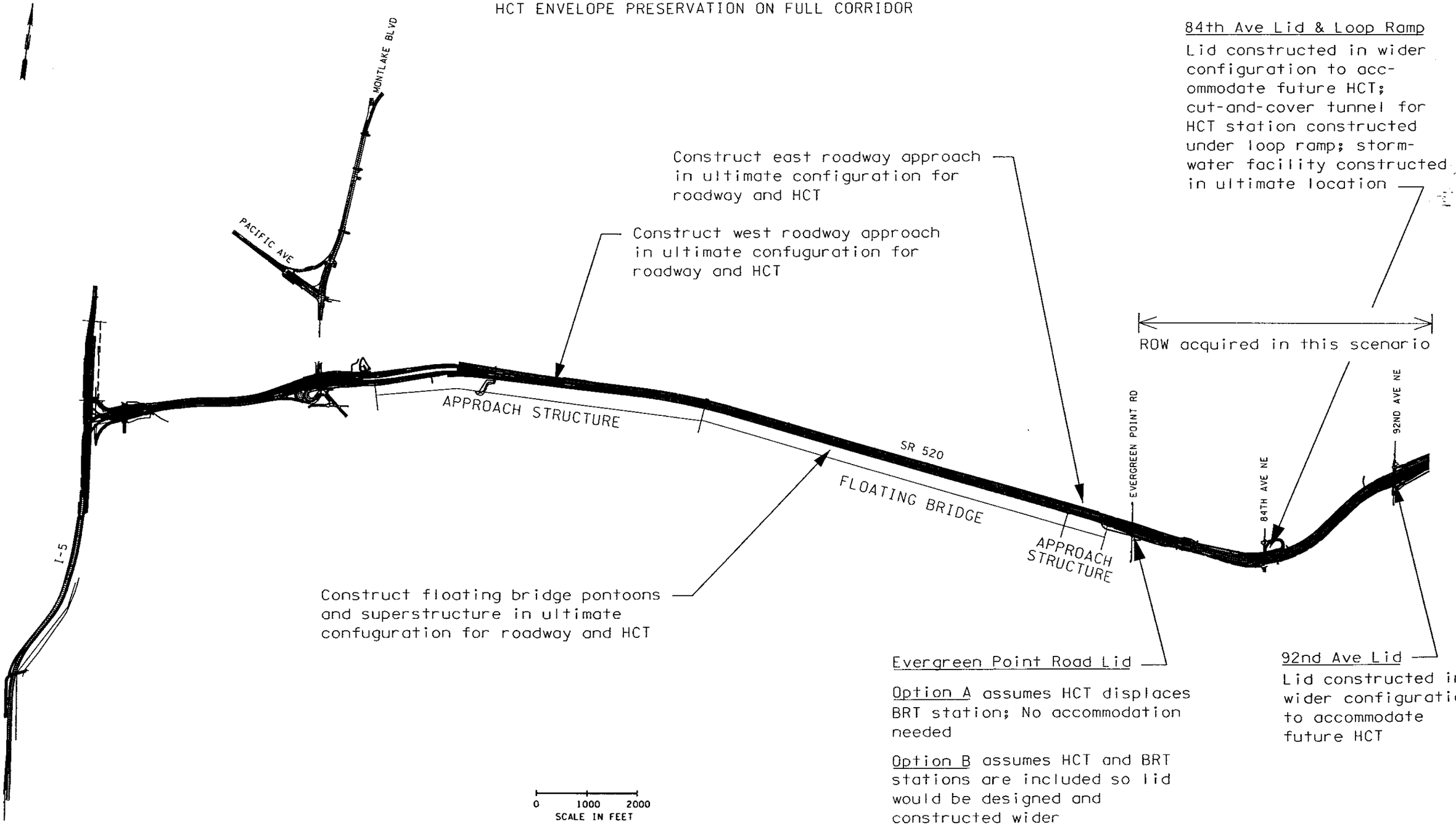
Appendix D – Schematic of Scenario 4

SCENARIO 4

HCT ENVELOPE PRESERVATION ON FULL CORRIDOR



Construct east roadway approach in ultimate configuration for roadway and HCT

Construct west roadway approach in ultimate confuguration for roadway and HCT

Construct floating bridge pontoons and superstructure in ultimate confuguration for roadway and HCT

84th Ave Lid & Loop Ramp

Lid constructed in wider configuration to accommodate future HCT; cut-and-cover tunnel for HCT station constructed under loop ramp; stormwater facility constructed in ultimate location

Evergreen Point Road Lid

Option A assumes HCT displaces BRT station; No accommodation needed

Option B assumes HCT and BRT stations are included so lid would be designed and constructed wider

92nd Ave Lid

Lid constructed in wider configuration to accommodate future HCT

FILE NAME	t:\Engr\Jeff Brauns\HCT Accommodation Scenarios.dgn				REGION NO.	STATE	FED.AID PROJ.NO.
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DATE	08/22/2002				JOB NUMBER		
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ENTERED BY	J. BRAUNS						
CHECKED BY	T. HAMSTRA						
PROJ. ENGR.	L. RUBSTELLO						
REGIONAL ADM.	D. DYE	REVISION	DATE	BY			

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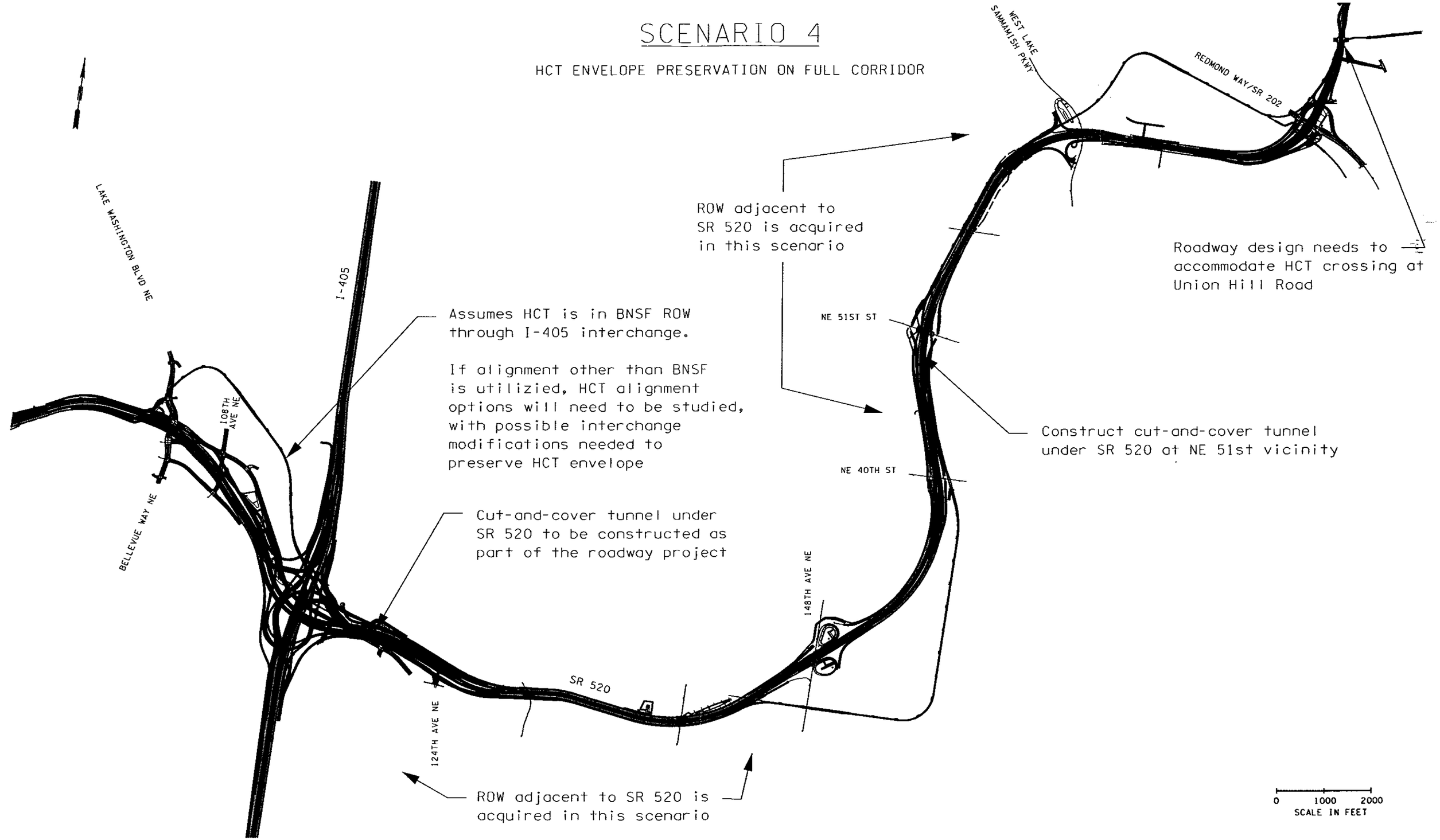
SR 520
TRANS-LAKE WASHINGTON PROJECT

HCT ACCOMMODATION REPORT

PLOT4
HCT7
SHEET 7 OF 8 SHEETS

SCENARIO 4

HCT ENVELOPE PRESERVATION ON FULL CORRIDOR



Assumes HCT is in BNSF ROW through I-405 interchange.

If alignment other than BNSF is utilizied, HCT alignment options will need to be studied, with possible interchange modifications needed to preserve HCT envelope

Cut-and-cover tunnel under SR 520 to be constructed as part of the roadway project

ROW adjacent to SR 520 is acquired in this scenario

ROW adjacent to SR 520 is acquired in this scenario

Roadway design needs to accommodate HCT crossing at Union Hill Road

Construct cut-and-cover tunnel under SR 520 at NE 51st vicinity

0 1000 2000
SCALE IN FEET

FILE NAME	t:\Engr\Jeff Brauns\HCT Accommodation Scenarios.dgn				REGION NO.	STATE	FED.AID PROJ.NO.
TIME	10:47:30 AM				10	WASH	
DATE	08/22/2002				JOB NUMBER		
DESIGNED BY					CONTRACT NO.		LOCATION NO.
ENTERED BY	J. BRAUNS						
CHECKED BY	T. HAMSTRA						
PROJ. ENGR.	L. RUBSTELLO						
REGIONAL ADM.	D. DYE	REVISION	DATE	BY			

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SR 520
TRANS-LAKE WASHINGTON PROJECT

HCT ACCOMMODATION REPORT

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HCT8

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Appendix E – Cost Information

Appendix E
HCT Accommodation Cost Summary

Scenario Description		Env Doc/Design Cost		ROW Costs		Construction		Subtotal		Subtotal	Combined Total
		Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond		
Scenario 1: No HCT Accomodation	Translake	$0	$0	$0	$0	$0	$0	$0	$0	**$0**	**$1,192**
	Future HCT	$355	$36	$60	$48	$630	$63	$1,044	$148	**$1,192**	
Scenario 2: Accomodation on Floating Bridge	Translake	$30	$0	$2	$0	$84	$0	$116	$0	**$116**	**$835**
	Future HCT	$215	$36	$58	$48	$298	$63	$571	$148	**$718**	
Scenario 3: HCT Accomodation on Entire Lake Crossing and at Key Structures	Translake	$52	$0	$2	$0	$136	$0	$190	$0	**$190**	**$756**
	Future HCT	$162	$35	$58	$48	$206	$58	$426	$141	**$567**	
Scenario 4: HCT Envelope Preservation	Translake	$210	$35	$60	$48	$332	$58	$602	$141	**$743**	**$743**
	Future HCT	$0	$0	$0	$0	$0	$0	$0	$0	**$0**	

Notes:

1 The cost opinion is presented for alternative analysis. It's intent is to capture the additional cost incurred to accommodate the HCT in the corridor. It does not capture HCT costs such as guideway, electrical, vehicles or other costs necessary to develop the HCT line.

2 All cost were calculated using the approved highway cost estimating methodology for the Trans-Lake project.

3 Costs are given for the six lane highway alternative.

4 All costs in presented in 2002 dollars so that furture & current cost can be directly compared.

This planning-level cost estimate is intended only for the comparison of different alternatives based on information available at the time of preparation. Because of the preliminary nature of this estimate, final project costs will vary from those shown and will depend on actual costs for labor, construction equipment, disposal, and materials as well as surface and subsurface conditions, regulatory constraints and approach to corridor mitigation, labor productivity, competitive market conditions, final project scope, schedule, and other factors. Cost opinions developed here do not contain sufficient accuracy to support the development of program budgets.

HCT Accommodation Cost Summary
Escalation of Cost from 2001 to 2002 dollars

Cost in 2001 dollars

		Env Doc/Design Cost		ROW Costs		Construction		Subtotal		
		Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond	Total
Scenario 1: No HCT Accomodation	Translake	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
	Future HCT	$345	$35	$58	$47	$612	$61	$1,015	$143	**$1,158**
Scenario 2: Accomodation on Floating Bridge	Translake	$29	$0	$2	$0	$82	$0	$113	$0	**$113**
	Future HCT	$209	$35	$56	$47	$290	$61	$555	$143	**$698**
Scenario 3: HCT Accomodation on Entire Lake Crossing and at Key Structures	Translake	$50	$0	$2	$0	$132	$0	$184	$0	**$184**
	Future HCT	$158	$34	$56	$47	$200	$56	$414	$137	**$551**
Scenario 4: HCT Envelope Preservation	Translake	$204	$34	$58	$47	$323	$56	$585	$137	**$722**
	Future HCT	$0	$0	$0	$0	$0	$0	$0	$0	**$0**

Cost escalated to 2002 dollars

		Env Doc/Design Cost		ROW Costs		Construction		Subtotal			
		Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond	Montlake to 124th	124th to Redmond	Total	Combined Total
Scenario 1: No HCT Accomodation	Translake	$0	$0	$0	$0	$0	$0	$0	$0	**$0**	**$1,192**
	Future HCT	$355	$36	$60	$48	$630	$63	$1,044	$148	**$1,192**	
Scenario 2: Accomodation on Floating Bridge	Translake	$30	$0	$2	$0	$84	$0	$116	$0	**$116**	**$835**
	Future HCT	$215	$36	$58	$48	$298	$63	$571	$148	**$718**	
Scenario 3: HCT Accomodation on Entire Lake Crossing and at Key Structures	Translake	$52	$0	$2	$0	$136	$0	$190	$0	**$190**	**$756**
	Future HCT	$162	$35	$58	$48	$206	$58	$426	$141	**$567**	
Scenario 4: HCT Envelope Preservation	Translake	$210	$35	$60	$48	$332	$58	$602	$141	**$743**	**$743**
	Future HCT	$0	$0	$0	$0	$0	$0	$0	$0	**$0**	

Notes:

1 The cost opinion is presented for alternative analysis. It's intent is to capture the additional cost incurred to accommodate the HCT in the corridor. It does not capture HCT costs such as track, guideway, or other cost necessary to develop the HCT line.
2 All cost were developed using the approved highway cost estimating methodology for the Trans-Lake project.
3 Scenario costs are given for the six lane highway alternative.
4 Potential EIS costs were determined by using 30% of the ROW and construction costs.

This planning-level cost estimate is intended only for the comparison of different alternatives based on information available at the time of preparation. Because of the preliminary nature of this estimate, final project costs will vary from those shown and will depend on actual costs for labor, construction equipment, disposal, and materials as well as surface and subsurface conditions, regulatory constraints and approach to corridor mitigation, labor productivity, competitive market conditions, final project scope, schedule, and other factors. Cost opinions developed here do not contain sufficient accuracy to support the development of program budgets.

HCT Accommodation Cost Elements in the SR 520 Corridor

Description	Env Doc/Design Costs		ROW Costs		Construction Costs	
	Current Costs In Millions (2001 Dollars)	Future Cost In Millions (2001 Dollars)	Current Costs In Millions (2001 Dollars)	Future Cost In Millions (2001 Dollars)	Current Costs In Millions (2001 Dollars)	Future Cost In Millions (2001 Dollars)
Scenario 1: No HCT Preservation/Accommodation						
Floating Bridge		$31		$0		$362
West Side: Option A		$9		$0		$136
West Side: Option B (Not usable with 8 lane tunnel)		$9		$0		$136
West Side: Option C		$10		$4		$142
East Side: Evergreen Point Bridge Option A		$3		$0		$27
East Side: Evergreen Point Bridge Option B		$4		$2		$34
East Side: East of Evergreen Point Lid		$9		$52		$74
EIS (Montlake to 124th)		*$291*				
124th to WLSP		$3		$42		$61
WLSP to NE Union		$0		$5		$0
EIS (124th to Redmond)		*$32*				
Scenario 2: HCT Accommodation on Floating Bridge						
Floating Bridge	$3	$2	$0	$0	$76	$57
West Side: Option A		$8		$0		$120
West Side: Option B (Not usable with 8 lane tunnel)		$8		$0		$120
West Side: Option C		$8		$4		$126
East Side: Evergreen Point Bridge Option A		$4		$0		$33
East Side: Evergreen Point Bridge Option B	$1	$4	$2	$0	$6	$33
East Side: East of Evergreen Point Lid		$9		$52		$74
EIS (Montlake to 124th)	*$25*	*$186*				
124th to WLSP		$3		$42		$61
Redmond Way to NE Union		$0		$5		$0
EIS (124th to Redmond)		*$32*				
Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures						
Floating Bridge	$3	$2	$0	$0	$76	$57
West Side: Option A		$7		$0		$101
West Side: Option B (Not usable with 8 lane tunnel)		$7		$0		$101
West Side: Option C		$7		$4		$106
East Side: Evergreen Point Bridge Option A		$3		$0		$21
East Side: Evergreen Point Bridge Option B	$1	$3	$2	$0	$6	$21
East Side: East of Evergreen Point Lid	$6	$2	$0	$52	$50	$16
EIS (Montlake to 124th)	*$40*	*$144*				
124th to WLSP (Six Lanes)		$3		$42		$56
124th to WLSP (Eight Lanes)	$3		$0	$42	$56	
Redmond Way to NE Union		$0		$5		$0
EIS (124th to Redmond) (Six Lanes)	*$0*	*$31*				
EIS (124th to Redmond) (Eight Lanes)	*$17*	*$14*				
Scenario 4: HCT Envelope Preservation						
Floating Bridge	$6		$0		$133	
West Side: Option A	$7		$0		$101	
West Side: Option B (Not usable with 8 lane tunnel)	$7		$0		$101	
West Side: Option C	$7		$4		$106	
East Side: Evergreen Point Bridge Option A	$3		$0		$21	
East Side: Evergreen Point Bridge Option B	$3		$2		$27	
East Side: East of Evergreen Point Lid	$7		$52		$57	
EIS (Montlake to 124th)	*$181*					
124th to WLSP	$3		$42		$56	
Redmond Way to NE Union	$0		$5		$0	
EIS (124th to Redmond)	*$31*					

Assumptions:

1 For costing purposes West Side option C and Eastside option B was used to calculate costs.
2 All cost were developed using the approved highway cost estimating methodology for the Trans-Lake project.
3 Scenario costs are given for the six lane highway alternative.
4 Potential EIS costs were determined by using 30% of the ROW and construction costs.

Scenario 1: No HCT Accommodation

HCT Cost During Initial Highway Construction

No Accommodation ***(No Cost)***

Future HCT Cost

Floating Bridge

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Reconstruct Floating Bridge for HCT	Floating Bridge	288,000	SF	$ 700	$ 201,600,000	
		Subtotal				$ 201,600,000	A
Notes:		Traffic Control on "A"	0.5%			$ 1,008,000	B
1. Assume that the floating bridge is expandable. Standard bridge cost is $350/sf for widening onto floating bridge use $700/sf for comparision purposes only.		Construction Staging on "A"	0%			$ -	C
		Removals on "A"	2%			$ 4,032,000	D
		Subtotal				$ 206,640,000	E
		Mobilization on "E"	8%			$ 16,531,200	F
		Misc Construction Allowance on "E"	15%			$ 30,996,000	G
		Construction Cost	Subtotal			$ 254,167,200	H
		Sales Tax on "H"	8.8%			$ 22,386,714	I
		Construction Administration on "H"	10%			$ 25,416,720	J
		Subtotal				$ 301,950,634	K
		Scope Contingency on "K"	20%			$ 60,390,127	L
		Construction Total (Rounded)				$ 362,000,000	M
		Preliminary Engineering on "H"	10%			$ 25,416,720	N
		Scope Contingency on "N"	20%			$ 5,083,344	O
		Preliminary Engineering (Rounded)				$ 31,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
		Right of Way (Rounded)				$ -	S

West Side: Option A

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Widen and strenghten/modify west approach structure for 1,800 ft	Widen bridge	72,000	SF	$ 300	$ 21,600,000	
		Upgrade exisitng bridge for HCT	1,800	RF	$ 810	$ 1,458,000	
	Install HCT Bridge Structure for remaining length	New Approach Structures to Lake Washington Crossing	4,800	RF	$ 8,130	$ 39,024,000	
		Subtotal				$ 62,082,000	A
Notes:		Traffic Control on "A"	10%			$ 6,208,200	B
1. Assume that approach structures can be widened.		Construction Staging on "A"	10%			$ 6,208,200	C
2. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Removals on "A"	5%			$ 3,104,100	D
		Subtotal				$ 77,602,500	E
3. Widen existing bridge structure to move highway lanes to outside for HCT to transition from inside to outside.		Mobilization on "E"	8%			$ 6,208,200	F
		Misc Construction Allowance on "E"	15%			$ 11,640,375	G
4. Use unit cost item 3170 - Upgrade for Existing Bridge Structure		Construction Cost	Subtotal			$ 95,451,075	H
		Sales Tax on "H"	8.8%			$ 8,399,695	I
		Construction Administration on "H"	10%			$ 9,545,108	J
		Subtotal				$ 113,395,877	K
		Scope Contingency on "K"	20%			$ 22,679,175	L
		Construction Total (Rounded)				$ 136,000,000	M
		Preliminary Engineering on "H"	8%			$ 7,636,086	N
		Scope Contingency on "N"	20%			$ 1,527,217	O
		Preliminary Engineering (Rounded)				$ 9,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
		Right of Way (Rounded)				$ -	S

Scenario 1: No HCT Accommodation

West Side: Option B (Not usable with 8 lane tunnel)

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Widen and strenghten/modify west approach structure	Widen bridge	72,000	SF	$ 300	$ 21,600,000	
		Upgrade exisitng bridge for HCT	1,800	RF	$ 810	$ 1,458,000	
	Install HCT Bridge Structure	New Approach Structures to Lake Washington Crossing	4,800	RF	$ 8,130	$ 39,024,000	
			Subtotal			$ 62,082,000	A
Notes:		Traffic Control on "A"	10%			$ 6,208,200	B
1. Assume that approach structures can be widened.		Construction Staging on "A"	10%			$ 6,208,200	C
2. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Removals on "A"	5%			$ 3,104,100	D
			Subtotal			$ 77,602,500	E
3. Widen existing bridge structure to move highway lanes to outside for HCT to transition from inside to outside.		Mobilization on "E"	8%			$ 6,208,200	F
		Misc Construction Allowance on "E"	15%			$ 11,640,375	G
4. Use unit cost item 3170 - Upgrade for Existing Bridge Structure		Construction Cost	Subtotal			$ 95,451,075	H
		Sales Tax on "H"	8.8%			$ 8,399,695	I
		Construction Administration on "H"	10%			$ 9,545,108	J
			Subtotal			$ 113,395,877	K
		Scope Contingency on "K"	20%			$ 22,679,175	L
			Construction Total (Rounded)			$ 136,000,000	M
		Preliminary Engineering on "H"	8%			$ 7,636,086	N
		Scope Contingency on "N"	20%			$ 1,527,217	O
			Preliminary Engineering (Rounded)			$ 9,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

West Side: Option C

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Widen non-accommodated Lid structure	Widen non-accommodated Non Ventilated Lid	17,500	SF	$ 145	$ 2,537,500	
	Widen and strenghten/modify west approach structure	Widen bridge	72,000	SF	$ 300	$ 21,600,000	
		Upgrade exisitng bridge for HCT	1,800	RF	$ 810	$ 1,458,000	
	Install HCT Bridge Structure	New Approach Structures to Lake Washington Crossing	4,800	RF	$ 8,130	$ 39,024,000	
			Subtotal			$ 64,619,500	A
Notes:		Traffic Control on "A"	10%			$ 6,461,950	B
1. Assume that approach structures can be widened.		Construction Staging on "A"	10%			$ 6,461,950	C
2. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Removals on "A"	5%			$ 3,230,975	D
			Subtotal			$ 80,774,375	E
3. Widen existing bridge structure to move highway lanes to outside for HCT to transition from inside to outside.		Mobilization on "E"	8%			$ 6,461,950	F
		Misc Construction Allowance on "E"	15%			$ 12,116,156	G
4. Use unit cost item 3170 - Upgrade for Existing Bridge Structure		Construction Cost	Subtotal			$ 99,352,481	H
		Sales Tax on "H"	8.8%			$ 8,743,018	I
		Construction Administration on "H"	10%			$ 9,935,248	J
			Subtotal			$ 118,030,748	K
		Scope Contingency on "K"	20%			$ 23,606,150	L
			Construction Total (Rounded)			$ 142,000,000	M
		Preliminary Engineering on "H"	8%			$ 7,948,199	N
		Scope Contingency on "N"	20%			$ 1,589,640	O
			Preliminary Engineering (Rounded)			$ 10,000,000	P
		Additional ROW for Widened Lid	20,000	SF	$ 175	$ 3,500,000	Q
		Scope Contingency on "Q"	20%			$ 700,000	R
			Right of Way (Rounded)			$ 4,000,000	S

East Side: Evergreen Point Bridge Option A

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Redesign non-accommodated BRT for HCT displacement		1	LS	$ 1,000,000	$ 1,000,000	
	Widen and strenghten/modify east approach structure	Widen bridge	40,000	SF	$ 200	$ 8,000,000	
		Upgrade exisitng bridge for HCT	1,800	RF	$ 810	$ 1,458,000	
			Subtotal			$ 10,458,000	A
Notes:		Traffic Control on "A"	15%			$ 1,568,700	B
1. Assume that approach structures can be widened.		Construction Staging on "A"	20%			$ 2,091,600	C
2. Widen existing bridge structure to move highway lanes to outside for HCT to transition from inside to outside.		Removals on "A"	10%			$ 1,045,800	D
			Subtotal			$ 15,164,100	E
3. Use unit cost item 3170 - Upgrade for Existing Bridge Structure		Mobilization on "E"	8%			$ 1,213,128	F
		Misc Construction Allowance on "E"	15%			$ 2,274,615	G
		Construction Cost	Subtotal			$ 18,651,843	H
		Sales Tax on "H"	8.8%			$ 1,641,362	I
		Construction Administration on "H"	10%			$ 1,865,184	J
			Subtotal			$ 22,158,389	K
		Scope Contingency on "K"	20%			$ 4,431,678	L
			Construction Total (Rounded)			$ 27,000,000	M
		Preliminary Engineering on "H"	15%			$ 2,797,776	N
		Scope Contingency on "N"	20%			$ 559,555	O
			Preliminary Engineering (Rounded)			$ 3,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

Scenario 1: No HCT Accommodation

East Side: Evergreen Point Bridge Option B

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Widen non-accommodated Lid structure	Widen non-accommodated Non Ventilated Lid	17,500	SF	$ 218	$ 3,806,250	
	Reconstruct approach structure to EP	Widen bridge	40,000	SF	$ 200	$ 8,000,000	
		Upgrade existing bridge for HCT	1,800	RF	$ 810	$ 1,458,000	
			Subtotal			$ 13,264,250	A
Notes:		Traffic Control on "A"	15%			$ 1,989,638	B
1. Assume that approach structures can be widened.		Construction Staging on "A"	20%			$ 2,652,850	C
2. Widen existing bridge structure to move highway lanes to outside for HCT to transition from inside to outside.		Removals on "A"	10%			$ 1,326,425	D
			Subtotal			$ 19,233,163	E
3. Use unit cost item 3170 - Upgrade for Existing Bridge Structure		Mobilization on "E"	8%			$ 1,538,653	F
4. Assume that the lid can be widened for HCT.		Misc Construction Allowance on "E"	15%			$ 2,884,974	G
		Construction Cost	Subtotal			$ 23,656,790	H
		Sales Tax on "H"	8.8%			$ 2,081,798	I
		Construction Administration on "H"	10%			$ 2,365,679	J
			Subtotal			$ 28,104,266	K
		Scope Contingency on "K"	20%			$ 5,620,853	L
			Construction Total (Rounded)			$ 34,000,000	M
		Preliminary Engineering on "H"	15%			$ 3,548,518	N
		Scope Contingency on "N"	20%			$ 709,704	O
			Preliminary Engineering (Rounded)			$ 4,000,000	P
		Additional ROW for Widened Lid	20,000	SF	$ 70	$ 1,400,000	Q
		Scope Contingency on "Q"	20%			$ 280,000	R
			Right of Way (Rounded)			$ 2,000,000	S

East Side: East of Evergreen Point Lid to I-405

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
Widen Median Past EP Lid							
	Widen highway median to HCT transition by moving two inside lane to outside	Pavment	4,000	Lane FT	$ 67	$ 268,000	
		Earthwork	4,000	Lane FT	$ 80	$ 320,000	
		New enclosed drainage system	2,000	LF	$ 70	$ 140,000	
		Replace Retaining Walls	5,000	SF	$ 60	$ 300,000	
		Replace Noise Wall	1,800	LF	$ 275	$ 495,000	
84th Avenue							
	Widen non-accommodated Lid structure	Widen non-accommodated Non Ventilated Lid	17,500	SF	$ 218	$ 3,806,250	
	Cut and Cover Structure at 84th ramp	HCT Cut & Cover	50	RF	$ 14,640	$ 732,000	
	Rebuild 84th ramp	Pavement	400	Lane FT	$ 67	$ 26,800	
	Demo and reconnect existing Stormwater pipes		1	LS	$ 120,000	$ 120,000	
	Convert FB-1 Stormwater pond to vault system under roadway	Detention vault equal to pond stroage	91,875	CF	$ 12	$ 1,102,500	
92nd Avenue							
	Widen non-accommodated Lid structure	Widen non-accommodated Non Ventilated Lid	17,500	SF	$ 218	$ 3,806,250	
East of I-405							
	Cut and Cover Structure under SR 520	HCT Cut & Cover	1,200	RF	$ 14,640	$ 17,568,000	
	Rebuild 6 lanes across SR 520 for 500' each side	Pavement	6,000	Lane FT	$ 67	$ 402,000	
			Subtotal			$ 29,086,800	A
Notes:		Traffic Control on "A"	15%			$ 4,363,020	B
1. Use HCT unit cost item 1160 - Cut and Cover Dual Track Tunnel Suburban minus track and systems cost.		Construction Staging on "A"	20%			$ 5,817,360	C
		Removals on "A"	10%			$ 2,908,680	D
2. Assume that the lid can be widened for HCT.			Subtotal			$ 42,175,860	E
		Mobilization on "E"	8%			$ 3,374,069	F
		Misc Construction Allowance on "E"	15%			$ 6,326,379	G
		Construction Cost	Subtotal			$ 51,876,308	H
		Sales Tax on "H"	8.8%			$ 4,565,115	I
		Construction Administration on "H"	10%			$ 5,187,631	J
			Subtotal			$ 61,629,054	K
		Scope Contingency on "K"	20%			$ 12,325,811	L
			Construction Total (Rounded)			$ 74,000,000	M
		Preliminary Engineering on "H"	15%			$ 7,781,446	N
		Scope Contingency on "N"	20%			$ 1,556,289	O
			Preliminary Engineering (Rounded)			$ 9,000,000	P
	Right of Way for widened median area		80,000	SF	$ 70	$ 5,600,000	M
	Right of Way along SR 520 to L Washington Blvd		260,000	SF	$ 70	$ 18,200,000	M
	Right of Way from I-405 to 124th		112,000	SF	$ 175	$ 19,600,000	M
		Scope Contingency on "Q"	20%			$ 8,680,000	R
			Right of Way (Rounded)			$ 52,000,000	S

Scenario 1: No HCT Accommodation

124th to WLSP

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
NE 51st							
	Cut and Cover Structure under SR 520 at NE 51st	HCT Cut & Cover	1,900	RF	$ 14,640	$ 27,816,000	
	Rebuild 6 lanes across SR 520 for 500' both sides	Pavement	6,000	Lane FT	$ 67	$ 402,000	
			Subtotal			$ 28,218,000	A
Notes:		Traffic Control on "A"	8%			$ 2,257,440	B
1. Use HCT unit cost item 1160 - Cut and Cover Dual Track Tunnel Suburban minus track and systems cost.		Construction Staging on "A"	10%			$ 2,821,800	C
		Removals on "A"	5%			$ 1,410,900	D
			Subtotal			$ 34,708,140	E
		Mobilization on "E"	8%			$ 2,776,651	F
		Misc Construction Allowance on "E"	15%			$ 5,206,221	G
		Construction Cost	Subtotal			$ 42,691,012	H
		Sales Tax on "H"	8.8%			$ 3,756,809	I
		Construction Administration on "H"	10%			$ 4,269,101	J
			Subtotal			$ 50,716,922	K
		Scope Contingency on "K"	20%			$ 10,143,384	L
			Construction Total (Rounded)			$ 61,000,000	M
		Preliminary Engineering on "H"	6%			$ 2,561,461	N
		Scope Contingency on "N"	20%			$ 512,292	O
			Preliminary Engineering (Rounded)			$ 3,000,000	P
		Right of Way along SR 520	562,400	SF	$ 62	$ 34,868,800	Q
		Scope Contingency on "Q"	20%			$ 6,973,760	R
			Right of Way (Rounded)			$ 42,000,000	S

Redmond Way to NE Union

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
						$ -	
			Subtotal			$ -	A
Notes:		Traffic Control on "A"	10%			$ -	B
1. Assume HCT can fit into the Redmond I/C		Construction Staging on "A"	10%			$ -	C
		Removals on "A"	5%			$ -	D
			Subtotal			$ -	E
		Mobilization on "E"	8%			$ -	F
		Misc Construction Allowance on "E"	15%			$ -	G
		Construction Cost	Subtotal			$ -	H
		Sales Tax on "H"	8.8%			$ -	I
		Construction Administration on "H"	10%			$ -	J
			Subtotal			$ -	K
		Scope Contingency on "K"	20%			$ -	L
			Construction Total (Rounded)			$ -	M
		Preliminary Engineering on "H"	10%			-	N
		Scope Contingency on "N"	20%		-	$ -	O
			Preliminary Engineering (Rounded)			$ -	P
		Right of Way along SR 520	68,000	SF	$ 62	$ 4,216,000	Q
		Scope Contingency on "Q"	20%			$ 843,200	R
			Right of Way (Rounded)			$ 5,000,000	S

Scenario 2: HCT Accommodation on Floating Bridge

HCT Cost During Initial Highway Construction

Floating Bridge

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Additional floating bridge pontoon width	Pontoon Substructure	216,000	SF	$ 200	$ 43,200,000	
			Subtotal			$ 43,200,000	A
Notes:		Traffic Control on "A"	0.5%			$ 216,000	B
		Construction Staging on "A"	0%			$ -	C
		Removals on "A"	0%			$ -	D
			Subtotal			$ 43,416,000	E
		Mobilization on "E"	8%			$ 3,473,280	F
		Construction Contingency on "E"	15%			$ 6,512,400	G
		Construction Cost	Subtotal			$ 53,401,680	H
		Sales Tax on "H"	8.8%			$ 4,699,348	I
		Construction Administration on "H"	10%			$ 5,340,168	J
			Subtotal			$ 63,441,196	K
		Scope Contingency on "K"	20%			$ 12,688,239	L
			Construction Total (Rounded)			$ 76,000,000	M
		Preliminary Engineering on "H"	5%			$ 2,670,084	N
		Scope Contingency on "N"	20%			$ 534,017	O
			Preliminary Engineering (Rounded)			$ 3,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

West Side

Foundations of the approach span are designed to accommodate future HCT. Design issue cost already included. ***(No Cost)***

East Side: Evergreen Point Bridge Option A

Design for future use of BRT Station ***(No Cost)***

East Side: Evergreen Point Bridge Option B

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Additional 35' of width to Evergreen Point Lid	Non Ventilated Lid	17,500	SF	$ 145	$ 2,537,500	
			Subtotal			$ 2,537,500	A
Notes:		Traffic Control on "A"	15%			$ 380,625	B
		Construction Staging on "A"	20%			$ 507,500	C
		Removals on "A"	10%			$ 253,750	D
			Subtotal			$ 3,679,375	E
		Mobilization on "E"	8%			$ 294,350	F
		Construction Contingency on "E"	15%			$ 551,906	G
		Construction Cost	Subtotal			$ 4,525,631	H
		Sales Tax on "H"	8.8%			$ 398,256	I
		Construction Administration on "H"	10%			$ 452,563	J
			Subtotal			$ 5,376,450	K
		Scope Contingency on "K"	20%			$ 1,075,290	L
			Construction Total (Rounded)			$ 6,000,000	M
		Preliminary Engineering on "H"	15%			$ 678,845	N
		Scope Contingency on "N"	20%			$ 135,769	O
			Preliminary Engineering (Rounded)			$ 1,000,000	P
		Additional ROW for Widened Lid	20,000	SF	$ 70	$ 1,400,000	Q
		Scope Contingency on "Q"	20%			$ 280,000	R
			Right of Way (Rounded)			$ 2,000,000	S

East Side: East of Evergreen Point Lid

No Accommodation ***(No Cost)***

124th to WLSP

No Accommodation ***(No Cost)***

Redmond Way to NE Union

No Accommodation ***(No Cost)***

Scenario 2: HCT Accommodation on Floating Bridge

Future HCT Cost

Floating Bridge

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Place superstructure on exisitng pontoons	Floating Bridge: Superstructure	216,000	SF	$ 150	$ 32,400,000	
			Subtotal			$ 32,400,000	A
Notes:		Traffic Control on "A"	0.5%			$ 162,000	B
		Construction Staging on "A"	0%			$ -	C
		Removals on "A"	0%			$ -	D
			Subtotal			$ 32,562,000	E
		Mobilization on "E"	8%			$ 2,604,960	F
		Construction Contingency on "E"	15%			$ 4,884,300	G
		Construction Cost	Subtotal			$ 40,051,260	H
		Sales Tax on "H"	8.8%			$ 3,524,511	I
		Construction Administration on "H"	10%			$ 4,005,126	J
			Subtotal			$ 47,580,897	K
		Scope Contingency on "K"	20%			$ 9,516,179	L
			Construction Total (Rounded)			$ 57,000,000	M
		Preliminary Engineering on "H"	5%			2,002,563	N
		Scope Contingency on "N"	20%			$ 400,513	O
			Preliminary Engineering (Rounded)			$ 2,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

West Side: Option A

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Widen and strenghten/modify west approach structure for 1,800 ft	Widen bridge	72,000	SF	$ 200	$ 14,400,000	
		Upgrade exisitng bridge for HCT	1,800	RF	$ 810	$ 1,458,000	
	Install HCT Bridge Structure for remaining length	New Approach Structures to Lake Washington Crossing	4,800	RF	$ 8,130	$ 39,024,000	
			Subtotal			$ 54,882,000	A
Notes:		Traffic Control on "A"	10%			$ 5,488,200	B
1. Assume that approach structures foundations are design to be widened for HCT.		Construction Staging on "A"	10%			$ 5,488,200	C
2. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Removals on "A"	5%			$ 2,744,100	D
			Subtotal			$ 68,602,500	E
3. Widen existing bridge structure to move highway lanes to outside for HCT to transition from inside to outside.		Mobilization on "E"	8%			$ 5,488,200	F
		Misc Construction Allowance on "E"	15%			$ 10,290,375	G
4. Use unit cost item 3170 - Upgrade for Existing Bridge Structure		Construction Cost	Subtotal			$ 84,381,075	H
		Sales Tax on "H"	8.8%			$ 7,425,535	I
		Construction Administration on "H"	10%			$ 8,438,108	J
			Subtotal			$ 100,244,717	K
		Scope Contingency on "K"	20%			$ 20,048,943	L
			Construction Total (Rounded)			$ 120,000,000	M
		Preliminary Engineering on "H"	8%			$ 6,750,486	N
		Scope Contingency on "N"	20%			$ 1,350,097	O
			Preliminary Engineering (Rounded)			$ 8,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

West Side: Option B

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Widen and strenghten/modify west approach structure	Widen bridge	72,000	SF	$ 200	$ 14,400,000	
		Upgrade exisitng bridge for HCT	1,800	RF	$ 810	$ 1,458,000	
	Install HCT Bridge Structure	New Approach Structures to Lake Washington Crossing	4,800	RF	$ 8,130	$ 39,024,000	
			Subtotal			$ 54,882,000	A
Notes:		Traffic Control on "A"	10%			$ 5,488,200	B
1. Assume that approach structures foundations are design to be widened for HCT.		Construction Staging on "A"	10%			$ 5,488,200	C
2. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Removals on "A"	5%			$ 2,744,100	D
			Subtotal			$ 68,602,500	E
3. Widen existing bridge structure to move highway lanes to outside for HCT to transition from inside to outside.		Mobilization on "E"	8%			$ 5,488,200	F
		Misc Construction Allowance on "E"	15%			$ 10,290,375	G
4. Use unit cost item 3170 - Upgrade for Existing Bridge Structure		Construction Cost	Subtotal			$ 84,381,075	H
		Sales Tax on "H"	8.8%			$ 7,425,535	I
		Construction Administration on "H"	10%			$ 8,438,108	J
			Subtotal			$ 100,244,717	K
		Scope Contingency on "K"	20%			$ 20,048,943	L
			Construction Total (Rounded)			$ 120,000,000	M
		Preliminary Engineering on "H"	8%			$ 6,750,486	N
		Scope Contingency on "N"	20%			$ 1,350,097	O
			Preliminary Engineering (Rounded)			$ 8,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

Scenario 2: HCT Accommodation on Floating Bridge

West Side: Option C

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Widen non-accommodated Lid structure	Widen non-accommodated Non Ventilated Li	17,500	SF	$ 145	$ 2,537,500	
	Widen and strenghten/modify west approach structure	Widen bridge	72,000	SF	$ 200	$ 14,400,000	
		Upgrade exisitng bridge for HCT	1,800	RF	$ 810	$ 1,458,000	
	Install HCT Bridge Structure	New Approach Structures to Lake Washington Crossing	4,800	RF	$ 8,130	$ 39,024,000	
			Subtotal			$ 57,419,500	A
Notes:		Traffic Control on "A"	10%			$ 5,741,950	B
1. Assume that approach structures foundations are design to be widened for HCT.		Construction Staging on "A"	10%			$ 5,741,950	C
2. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Removals on "A"	5%			$ 2,870,975	D
			Subtotal			$ 71,774,375	E
3. Widen existing bridge structure to move highway lanes to outside for HCT to transition from inside to outside.		Mobilization on "E"	8%			$ 5,741,950	F
		Misc Construction Allowance on "E"	15%			$ 10,766,156	G
4. Use unit cost item 3170 - Upgrade for Existing Bridge Structure		Construction Cost	Subtotal			$ 88,282,481	H
		Sales Tax on "H"	8.8%			$ 7,768,858	I
		Construction Administration on "H"	10%			$ 8,828,248	J
			Subtotal			$ 104,879,588	K
		Scope Contingency on "K"	20%			$ 20,975,918	L
			Construction Total (Rounded)			$ 126,000,000	M
		Preliminary Engineering on "H"	8%			$ 7,062,599	N
		Scope Contingency on "N"	20%			$ 1,412,520	O
			Preliminary Engineering (Rounded)			$ 8,000,000	P
		Additional ROW for Widened Lid	20,000	SF	$ 175	$ 3,500,000	Q
		Scope Contingency on "Q"	20%			$ 700,000	R
			Right of Way (Rounded)			$ 4,000,000	S

East Side: Evergreen Point Bridge Option A

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	BRT replacement by HCT has been accomodated for.						
	Reconstruct approach structure to EP	Widen bridge	40,000	SF	$ 200	$ 8,000,000	
		Strengthen for HCT	40,000	SF	$ 120	$ 4,800,000	
			Subtotal			$ 12,800,000	A
Notes:		Traffic Control on "A"	15%			$ 1,920,000	B
1. Assume that approach structures can be widened.		Construction Staging on "A"	20%			$ 2,560,000	C
2. Cost to strengthen bridge is difference between $271/sf for HCT approach structure and the $150/sf for standard highway approach span.		Removals on "A"	10%			$ 1,280,000	D
			Subtotal			$ 18,560,000	E
		Mobilization on "E"	8%			$ 1,484,800	F
		Construction Contingency on "E"	15%			$ 2,784,000	G
		Construction Cost	Subtotal			$ 22,828,800	H
		Sales Tax on "H"	8.8%			$ 2,008,934	I
		Construction Administration on "H"	10%			$ 2,282,880	J
			Subtotal			$ 27,120,614	K
		Scope Contingency on "K"	20%			$ 5,424,123	L
			Construction Total (Rounded)			$ 33,000,000	M
		Preliminary Engineering on "H"	15%			3,424,320	N
		Scope Contingency on "N"	20%			$ 684,864	O
			Preliminary Engineering (Rounded)			$ 4,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

East Side: Evergreen Point Bridge Option B

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Place HCT in provided lid space						
	Reconstruct approach structure to EP	Widen bridge	40,000	SF	$ 200	$ 8,000,000	
		Strengthen for HCT	40,000	SF	$ 120	$ 4,800,000	
			Subtotal			$ 12,800,000	A
Notes:		Traffic Control on "A"	15%			$ 1,920,000	B
1. Assume that approach structures can be widened.		Construction Staging on "A"	20%			$ 2,560,000	C
2. Cost to strengthen bridge is difference between $271/sf for HCT approach structure and the $150/sf for standard highway approach span.		Removals on "A"	10%			$ 1,280,000	D
			Subtotal			$ 18,560,000	E
		Mobilization on "E"	8%			$ 1,484,800	F
		Construction Contingency on "E"	15%			$ 2,784,000	G
		Construction Cost	Subtotal			$ 22,828,800	H
		Sales Tax on "H"	8.8%			$ 2,008,934	I
		Construction Administration on "H"	10%			$ 2,282,880	J
			Subtotal			$ 27,120,614	K
		Scope Contingency on "K"	20%			$ 5,424,123	L
			Construction Total (Rounded)			$ 33,000,000	M
		Preliminary Engineering on "H"	15%			3,424,320	N
		Scope Contingency on "N"	20%			$ 684,864	O
			Preliminary Engineering (Rounded)			$ 4,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

Scenario 2: HCT Accommodation on Floating Bridge

East Side: East of Evergreen Point Lid

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
Widen Median Past EP Lid							
	Replace two lanes to outside	Pavment	4,000	Lane FT	$ 67	$ 268,000	
		Earthwork	4,000	Lane FT	$ 80	$ 320,000	
		Enclosed drainage system	2,000	LF	$ 70	$ 140,000	
		Replace Retaining Walls	5,000	SF	$ 60	$ 300,000	
		Replace Noise Wall	1,800	LF	$ 275	$ 495,000	
84th Avenue							
	Widen non-accommodated Lid structure	Widen non-accommodated Non Ventilated Li	17,500	SF	$ 218	$ 3,806,250	
	Cut and Cover Structure at 84th ramp	HCT Cut & Cover	50	RF	$ 14,640	$ 732,000	
	Rebuild 84th ramp	Pavement	400	Lane FT	$ 67	$ 26,800	
	Demo and reconnect existing Stormwater pipes		1	LS	$ 120,000	$ 120,000	
	Convert FB-1 Stormwater pond to vault system under roadway	Detention vault equal to pond stroage	91,875	CF	$ 12	$ 1,102,500	
92nd Avenue							
	Widen non-accommodated Lid structure	Widen non-accommodated Non Ventilated Li	17,500	SF	$ 218	$ 3,806,250	
East of I-405							
	Cut and Cover Structure under SR 520	HCT Cut & Cover	1,200	RF	$ 14,640	$ 17,568,000	
	Rebuild 6 lanes across SR 520 for 500' each side	Pavement	6,000	Lane FT	$ 67	$ 402,000	
			Subtotal			$ 29,086,800	A
Notes:		Traffic Control on "A"	15%			$ 4,363,020	B
1. Use HCT unit cost item 1160 - Cut and Cover Dual Track Tunnel Suburban minus track and systems cost.		Construction Staging on "A"	20%			$ 5,817,360	C
		Removals on "A"	10%			$ 2,908,680	D
2. Assume that the lid can be widened for HCT.			Subtotal			$ 42,175,860	E
		Mobilization on "E"	8%			$ 3,374,069	F
		Construction Contingency on "E"	15%			$ 6,326,379	G
		Construction Cost	Subtotal			$ 51,876,308	H
		Sales Tax on "H"	8.8%			$ 4,565,115	I
		Construction Administration on "H"	10%			$ 5,187,631	J
			Subtotal			$ 61,629,054	K
		Scope Contingency on "K"	20%			$ 12,325,811	L
		Construction Total (Rounded)				$ 74,000,000	M
		Preliminary Engineering on "H"	15%			7,781,446	N
		Scope Contingency on "N"	20%			$ 1,556,289	O
		Preliminary Engineering (Rounded)				$ 9,000,000	P
	Right of Way for widened median area		80,000	SF	$ 70	$ 5,600,000	M
	Right of Way along SR 520 to L Washington Blvd		260,000	SF	$ 70	$ 18,200,000	M
	Right of Way from I-405 to 124th		112,000	SF	$ 175	$ 19,600,000	M
		Scope Contingency on "Q"	20%			$ 8,680,000	R
		Right of Way (Rounded)				$ 52,000,000	S

124th to WLSP

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
51st Ave							
	Cut and Cover Structure under SR 520 at 51	HCT Cut & Cover	1,900	RF	$ 14,640	$ 27,816,000	
	Rebuild 6 lanes across SR 520 for 500' both sides	Pavement	6,000	Lane FT	$ 67	$ 402,000	
			Subtotal			$ 28,218,000	A
Notes:		Traffic Control on "A"	8%			$ 2,257,440	B
1. Use HCT unit cost item 1160 - Cut and Cover Dual Track Tunnel Suburban minus track and systems cost.		Construction Staging on "A"	10%			$ 2,821,800	C
		Removals on "A"	5%			$ 1,410,900	D
			Subtotal			$ 34,708,140	E
		Mobilization on "E"	8%			$ 2,776,651	F
		Construction Contingency on "E"	15%			$ 5,206,221	G
		Construction Cost	Subtotal			$ 42,691,012	H
		Sales Tax on "H"	8.8%			$ 3,756,809	I
		Construction Administration on "H"	10%			$ 4,269,101	J
			Subtotal			$ 50,716,922	K
		Scope Contingency on "K"	20%			$ 10,143,384	L
		Construction Total (Rounded)				$ 61,000,000	M
		Preliminary Engineering on "H"	6%			$ 2,561,461	N
		Scope Contingency on "N"	20%			$ 512,292	O
		Preliminary Engineering (Rounded)				$ 3,000,000	P
		Right of Way along SR 520	562,400	SF	$ 62	$ 34,868,800	Q
		Scope Contingency on "Q"	20%			$ 6,973,760	R
		Right of Way (Rounded)				$ 42,000,000	S

Scenario 2: HCT Accommodation on Floating Bridge

Redmond Way to NE Union

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	I/C was designed to accommodate HCT					$ -	
			Subtotal			$ -	A
Notes:		Traffic Control on "A"	10%			$ -	B
		Construction Staging on "A"	10%			$ -	C
		Removals on "A"	5%			$ -	D
			Subtotal			$ -	E
		Mobilization on "E"	8%			$ -	F
		Construction Contingency on "E"	15%			$ -	G
		Construction Cost	Subtotal			$ -	H
		Sales Tax on "H"	8.8%			$ -	I
		Construction Administration on "H"	10%			$ -	J
			Subtotal			$ -	K
		Scope Contingency on "K"	20%			$ -	L
			Construction Total (Rounded)			$ -	M
		Preliminary Engineering on "H"	10%			$ -	N
		Scope Contingency on "N"	20%			$ -	O
			Preliminary Engineering (Rounded)			$ -	P
		Right of Way along SR 520	68,000	SF	$ 62	$ 4,216,000	Q
		Scope Contingency on "Q"	20%			$ 843,200	R
			Right of Way (Rounded)			$ 5,000,000	S

Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures

HCT Cost During Initial Highway Construction

Floating Bridge

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Additional floating bridge pontoon width	Pontoon Substructure	216,000	SF	$ 200	$ 43,200,000	
			Subtotal			$ 43,200,000	A
Notes:		Traffic Control on "A"	0.5%			$ 216,000	B
		Construction Staging on "A"	0%			$ -	C
		Removals on "A"	0%			$ -	D
			Subtotal			$ 43,416,000	E
		Mobilization on "E"	8%			$ 3,473,280	F
		Construction Contingency on "E"	15%			$ 6,512,400	G
		Construction Cost	Subtotal			$ 53,401,680	H
		Sales Tax on "H"	8.8%			$ 4,699,348	I
		Construction Administration on "H"	10%			$ 5,340,168	J
			Subtotal			$ 63,441,196	K
		Scope Contingency on "K"	20%			$ 12,688,239	L
			Construction Total (Rounded)			$ 76,000,000	M
		Preliminary Engineering on "H"	5%			$ 2,670,084	N
		Scope Contingency on "N"	20%			$ 534,017	O
			Preliminary Engineering (Rounded)			$ 3,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

West Side

Construct the approach structure with a gap between the eastbound and westbound lanes long enough to accommodate for the transtion from the inside. ***(No Cost)***

For Option C where the Montlake Lid needs to be widened design lid to accommodate widening. These are design issues and don't add to the overall cost. ***(No Cost)***

East Side: Evergreen Point Bridge Option A

Design for future use of BRT Station. ***(No Cost)***

East Side: Evergreen Point Bridge Option B

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Additional 35' of width to Evergreen Point Lid Leave gap between approach structures	Non Ventilated Lid	17,500	SF	$ 145	$ 2,537,500	
			Subtotal			$ 2,537,500	A
Notes:		Traffic Control on "A"	15%			$ 380,625	B
		Construction Staging on "A"	20%			$ 507,500	C
		Removals on "A"	10%			$ 253,750	D
			Subtotal			$ 3,679,375	E
		Mobilization on "E"	8%			$ 294,350	F
		Construction Contingency on "E"	15%			$ 551,906	G
		Construction Cost	Subtotal			$ 4,525,631	H
		Sales Tax on "H"	8.8%			$ 398,256	I
		Construction Administration on "H"	10%			$ 452,563	J
			Subtotal			$ 5,376,450	K
		Scope Contingency on "K"	20%			$ 1,075,290	L
			Construction Total (Rounded)			$ 6,000,000	M
		Preliminary Engineering on "H"	15%			$ 678,845	N
		Scope Contingency on "N"	20%			$ 135,769	O
			Preliminary Engineering (Rounded)			$ 1,000,000	P
		Additional ROW for Widened Lid	20,000	SF	$ 70	$ 1,400,000	Q
		Scope Contingency on "Q"	20%			$ 280,000	R
			Right of Way (Rounded)			$ 2,000,000	S

Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures

East Side: East of Evergreen Point Lid

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
SR 520 Lanes East of Evergreen Point							
	Widened median transition area is constructed for future HCT. No cost except in ROW purchase.						
84th Avenue							
	Design Lid to accommodate future expansion.						
	Cut and Cover Structure at 84th ramp	HCT Cut & Cover	50	RF	$ 14,640	$ 732,000	
	Rebuild 84th ramp	Pavement	400	Lane FT	$ 67	$ 26,800	
	Construct FB-1 Stormwater pond to vault system under roadway	Detention vault equal to pond stroage	91,875	CF	$ 12	$ 1,102,500	
92nd Avenue							
	Design 92nd Lid to be expandable in future					$ -	
East of I-405							
	Cut and Cover Structure under SR 520	HCT Cut & Cover	1,200	RF	$ 14,640	$ 17,568,000	
	Rebuild 6 lanes across SR 520	Pavement	6,000	Lane FT	$ 67	$ 402,000	
			Subtotal			$ 19,831,300	A
Notes:		Traffic Control on "A"	15%			$ 2,974,695	B
1. Use HCT unit cost item 1160 - Cut and Cover Dual Track Tunnel Suburban minus track and systems cost.		Construction Staging on "A"	20%			$ 3,966,260	C
		Removals on "A"	10%			$ 1,983,130	D
			Subtotal			$ 28,755,385	E
		Mobilization on "E"	8%			$ 2,300,431	F
		Construction Contingency on "E"	15%			$ 4,313,308	G
		Construction Cost	Subtotal			$ 35,369,124	H
		Sales Tax on "H"	8.8%			$ 3,112,483	I
		Construction Administration on "H"	10%			$ 3,536,912	J
			Subtotal			$ 42,018,519	K
		Scope Contingency on "K"	20%			$ 8,403,704	L
			Construction Total (Rounded)			$ 50,000,000	M
		Preliminary Engineering on "H"	15%			5,305,369	N
		Scope Contingency on "N"	20%			$ 1,061,074	O
			Preliminary Engineering (Rounded)			$ 6,000,000	P
		Right of Way		SF		$ -	M
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

124th to WLSP

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
51st Ave (8 lanes only)							
	Cut and Cover Structure under SR 520 at 51	HCT Cut & Cover	1,900	RF	$ 14,640	$ 27,816,000	
	Rebuild 6 lanes across SR 520 for 500' both sides	Pavement	6,000	Lane FT	$ 67	$ 402,000	
			Subtotal			$ 28,218,000	A
Notes:		Traffic Control on "A"	4%			$ 1,128,720	B
1. Use HCT unit cost item 1160 - Cut and Cover Dual Track Tunnel Suburban minus track and systems cost.		Construction Staging on "A"	5%			$ 1,410,900	C
2. The 51st cut and cover crossing will only be constructed for the eight lane scenario since under the six lane scenario no work work occur in this section of the corridor during the highway construction.		Removals on "A"	5%			$ 1,410,900	D
			Subtotal			$ 32,168,520	E
		Mobilization on "E"	8%			$ 2,573,482	F
		Construction Contingency on "E"	15%			$ 4,825,278	G
		Construction Cost	Subtotal			$ 39,567,280	H
		Sales Tax on "H"	8.8%			$ 3,481,921	I
		Construction Administration on "H"	10%			$ 3,956,728	J
			Subtotal			$ 47,005,928	K
		Scope Contingency on "K"	20%			$ 9,401,186	L
			Construction Total (Rounded)			$ 56,000,000	M
		Preliminary Engineering on "H"	6%			2,374,037	N
		Scope Contingency on "N"	20%			$ 474,807	O
			Preliminary Engineering (Rounded)			$ 3,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

Redmond Way to NE Union

Design interchange for future HCT. ***(No cost)***

Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures

Future HCT Cost

Floating Bridge

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Place superstructure on exisitng pontoons	Floating Bridge: Superstructure	216,000	SF	$ 150	$ 32,400,000	
			Subtotal			$ 32,400,000	A
Notes:		Traffic Control on "A"	0.5%			$ 162,000	B
		Construction Staging on "A"	0%			$ -	C
		Removals on "A"	0%			$ -	D
			Subtotal			$ 32,562,000	E
		Mobilization on "E"	8%			$ 2,604,960	F
		Construction Contingency on "E"	15%			$ 4,884,300	G
		Construction Cost	Subtotal			$ 40,051,260	H
		Sales Tax on "H"	8.8%			$ 3,524,511	I
		Construction Administration on "H"	10%			$ 4,005,126	J
			Subtotal			$ 47,580,897	K
		Scope Contingency on "K"	20%			$ 9,516,179	L
			Construction Total (Rounded)			$ 57,000,000	M
		Preliminary Engineering on "H"	5%			2,002,563	N
		Scope Contingency on "N"	20%			$ 400,513	O
			Preliminary Engineering (Rounded)			$ 2,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

West Side: Option A

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Install HCT Bridge Structure in gap and to Montlake	New Approach Structures to Lake Washington Crossing	6,600	RF	$ 8,130	$ 53,658,000	
			Subtotal			$ 53,658,000	A
Notes:		Traffic Control on "A"	3.5%			$ 1,878,030	B
1. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Construction Staging on "A"	4%			$ 2,146,320	C
		Removals on "A"	0%			$ -	D
			Subtotal			$ 57,682,350	E
		Mobilization on "E"	8%			$ 4,614,588	F
		Construction Contingency on "E"	15%			$ 8,652,353	G
		Construction Cost	Subtotal			$ 70,949,291	H
		Sales Tax on "H"	8.8%			$ 6,243,538	I
		Construction Administration on "H"	10%			$ 7,094,929	J
			Subtotal			$ 84,287,757	K
		Scope Contingency on "K"	20%			$ 16,857,551	L
			Construction Total (Rounded)			$ 101,000,000	M
		Preliminary Engineering on "H"	8%			5,675,943	N
		Scope Contingency on "N"	20%			$ 1,135,189	O
			Preliminary Engineering (Rounded)			$ 7,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

West Side: Option B (Not usable with 8 lane tunnel)

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Install HCT Bridge Structure in gap and to Montlake	New Approach Structures to Lake Washington Crossing	6,600	RF	$ 8,130	$ 53,658,000	
			Subtotal			$ 53,658,000	A
Notes:		Traffic Control on "A"	3.5%			$ 1,878,030	B
1. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Construction Staging on "A"	4%			$ 2,146,320	C
		Removals on "A"	0%			$ -	D
			Subtotal			$ 57,682,350	E
		Mobilization on "E"	8%			$ 4,614,588	F
		Construction Contingency on "E"	15%			$ 8,652,353	G
		Construction Cost	Subtotal			$ 70,949,291	H
		Sales Tax on "H"	8.8%			$ 6,243,538	I
		Construction Administration on "H"	10%			$ 7,094,929	J
			Subtotal			$ 84,287,757	K
		Scope Contingency on "K"	20%			$ 16,857,551	L
			Construction Total (Rounded)			$ 101,000,000	M
		Preliminary Engineering on "H"	8%			5,675,943	N
		Scope Contingency on "N"	20%			$ 1,135,189	O
			Preliminary Engineering (Rounded)			$ 7,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures

West Side: Option C

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Reconstruct Montlake Lid for HCT Tunnel Enterance which has been designed for expansion.	Non Ventilated Lid	17,500	SF	$ 145	$ 2,537,500	
	Install HCT Bridge Structure in gap and to Montlake	New Approach Structures to Lake Washington Crossing	6,600	RF	$ 8,130	$ 53,658,000	
			Subtotal			$ 56,195,500	A
Notes:		Traffic Control on "A"	3.5%			$ 1,966,843	B
1. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Construction Staging on "A"	4%			$ 2,247,820	C
		Removals on "A"	0%			$ -	D
			Subtotal			$ 60,410,163	E
		Mobilization on "E"	8%			$ 4,832,813	F
		Construction Contingency on "E"	15%			$ 9,061,524	G
		Construction Cost	Subtotal			$ 74,304,500	H
		Sales Tax on "H"	8.8%			$ 6,538,796	I
		Construction Administration on "H"	10%			$ 7,430,450	J
			Subtotal			$ 88,273,746	K
		Scope Contingency on "K"	20%			$ 17,654,749	L
			Construction Total (Rounded)			$ 106,000,000	M
		Preliminary Engineering on "H"	8%			5,944,360	N
		Scope Contingency on "N"	20%			$ 1,188,872	O
			Preliminary Engineering (Rounded)			$ 7,000,000	P
		Additional ROW for Widened Lid	20,000	SF	$ 175	$ 3,500,000	Q
		Scope Contingency on "Q"	20%			$ 700,000	R
			Right of Way (Rounded)			$ 4,000,000	S

East Side: Evergreen Point Bridge Option A

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	BRT replacement by HCT has been accomodated for.						
	Install HCT Bridge Structure in gap.	New Approach Structures to Lake Washington Crossing	1,000	RF	$ 8,130	$ 8,130,000	
			Subtotal			$ 8,130,000	A
Notes:		Traffic Control on "A"	15%			$ 1,219,500	B
1. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Construction Staging on "A"	20%			$ 1,626,000	C
		Removals on "A"	10%			$ 813,000	D
			Subtotal			$ 11,788,500	E
		Mobilization on "E"	8%			$ 943,080	F
		Construction Contingency on "E"	15%			$ 1,768,275	G
		Construction Cost	Subtotal			$ 14,499,855	H
		Sales Tax on "H"	8.8%			$ 1,275,987	I
		Construction Administration on "H"	10%			$ 1,449,986	J
			Subtotal			$ 17,225,828	K
		Scope Contingency on "K"	20%			$ 3,445,166	L
			Construction Total (Rounded)			$ 21,000,000	M
		Preliminary Engineering on "H"	15%			2,174,978	N
		Scope Contingency on "N"	20%			$ 434,996	O
			Preliminary Engineering (Rounded)			$ 3,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

East Side: Evergreen Point Bridge Option B

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Place HCT in provided lid space						
	Install HCT Bridge Structure in gap.	New Approach Structures to Lake Washington Crossing	1,000	RF	$ 8,130	$ 8,130,000	
			Subtotal			$ 8,130,000	A
Notes:		Traffic Control on "A"	15%			$ 1,219,500	B
1. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Construction Staging on "A"	20%			$ 1,626,000	C
		Removals on "A"	10%			$ 813,000	D
			Subtotal			$ 11,788,500	E
		Mobilization on "E"	8%			$ 943,080	F
		Construction Contingency on "E"	15%			$ 1,768,275	G
		Construction Cost	Subtotal			$ 14,499,855	H
		Sales Tax on "H"	8.8%			$ 1,275,987	I
		Construction Administration on "H"	10%			$ 1,449,986	J
			Subtotal			$ 17,225,828	K
		Scope Contingency on "K"	20%			$ 3,445,166	L
			Construction Total (Rounded)			$ 21,000,000	M
		Preliminary Engineering on "H"	15%			2,174,978	N
		Scope Contingency on "N"	20%			$ 434,996	O
			Preliminary Engineering (Rounded)			$ 3,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures

East Side: East of Evergreen Point Lid

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
Widen Median Past EP Lid							
	Replace two lanes to outside	Pavment	4,000	Lane FT	$ 67	$ 268,000	
		Earthwork	4,000	Lane FT	$ 80	$ 320,000	
		Enclosed drainage system	2,000	LF	$ 70	$ 140,000	
		Replace Retaining Walls	5,000	SF	$ 60	$ 300,000	
		Replace Noise Wall	1,800	LF	$ 275	$ 495,000	
84th Avenue							
	Widen accommodated Lid structure	Non Ventilated Lid	17,500	SF	$ 145	$ 2,537,500	
	Exisiting Cut and Cover Structure at 84th ramp					$ -	
92nd Avenue							
	Widen accommodated Lid structure	Non Ventilated Lid	15,000	SF	$ 145	$ 2,175,000	
East of I-405							
	Existing Cut and Cover Structure under SR 520	HCT Cut & Cover				$ -	
			Subtotal			$ 6,235,500	A
Notes:		Traffic Control on "A"	15%			$ 935,325	B
		Construction Staging on "A"	20%			$ 1,247,100	C
		Removals on "A"	10%			$ 623,550	D
			Subtotal			$ 9,041,475	E
		Mobilization on "E"	8%			$ 723,318	F
		Construction Contingency on "E"	15%			$ 1,356,221	G
		Construction Cost	Subtotal			$ 11,121,014	H
		Sales Tax on "H"	8.8%			$ 978,649	I
		Construction Administration on "H"	10%			$ 1,112,101	J
			Subtotal			$ 13,211,765	K
		Scope Contingency on "K"	20%			$ 2,642,353	L
			Construction Total (Rounded)			$ 16,000,000	M
		Preliminary Engineering on "H"	15%			1,668,152	N
		Scope Contingency on "N"	20%			$ 333,630	O
			Preliminary Engineering (Rounded)			$ 2,000,000	P
	Right of Way for widened median area		80,000	SF	$ 70	$ 5,600,000	
	Right of Way along SR 520 to L Washington Blvd		260,000	SF	$ 70	$ 18,200,000	M
	Right of Way from I-405 to 124th		112,000	SF	$ 175	$ 19,600,000	M
		Scope Contingency on "Q"	20%			$ 8,680,000	R
			Right of Way (Rounded)			$ 52,000,000	S

124th to WLSP

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
51st Ave (8 lanes)							
	No Work. Existing Cut and Cover Structure under SR 520 at 51						
51st Ave (6 lanes)							
	Cut and Cover Structure under SR 520 at 51	HCT Cut & Cover	1,900	RF	$ 14,640	$ 27,816,000	
	Rebuild 6 lanes across SR 520 for 500' both sides	Pavement	6,000	Lane FT	$ 67	$ 402,000	
			Subtotal			$ 28,218,000	A
Notes:		Traffic Control on "A"	4%			$ 1,128,720	B
1. The 51st cut and cover crossing was only constructed for the eight lane scenario since under the six lane scenario no work work occur in this section. Therefore the 51st cut and cover structure would occur as a future cost in the six lane alternative.		Construction Staging on "A"	5%			$ 1,410,900	C
		Removals on "A"	5%			$ 1,410,900	D
			Subtotal			$ 32,168,520	E
		Mobilization on "E"	8%			$ 2,573,482	F
		Construction Contingency on "E"	15%			$ 4,825,278	G
		Construction Cost	Subtotal			$ 39,567,280	H
		Sales Tax on "H"	8.8%			$ 3,481,921	I
		Construction Administration on "H"	10%			$ 3,956,728	J
			Subtotal			$ 47,005,928	K
		Scope Contingency on "K"	20%			$ 9,401,186	L
			Construction Total (Rounded)			$ 56,000,000	M
		Preliminary Engineering on "H"	6%			2,374,037	N
		Scope Contingency on "N"	20%			$ 474,807	O
			Preliminary Engineering (Rounded)			$ 3,000,000	P
		Right of Way along SR 520	562,400	SF	$ 62	$ 34,868,800	Q
		Scope Contingency on "Q"	20%			$ 6,973,760	R
			Right of Way (Rounded)			$ 42,000,000	S

Scenario 3: HCT Accommodation on Entire Lake Crossing and at Key Structures

Redmond Way to NE Union

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	I/C was designed to accommodate HCT						
			Subtotal			$ -	A
Notes:		Traffic Control on "A"	10%			$ -	B
		Construction Staging on "A"	10%			$ -	C
		Removals on "A"	5%			$ -	D
			Subtotal			$ -	E
		Mobilization on "E"	8%			$ -	F
		Construction Contingency on "E"	15%			$ -	G
		Construction Cost	Subtotal			$ -	H
		Sales Tax on "H"	8.8%			$ -	I
		Construction Administration on "H"	10%			$ -	J
			Subtotal			$ -	K
		Scope Contingency on "K"	20%			$ -	L
			Construction Total (Rounded)			$ -	M
		Preliminary Engineering on "H"	10%			-	N
		Scope Contingency on "N"	20%			$ -	O
			Preliminary Engineering (Rounded)			$ -	P
		Right of Way along SR 520	68,000	SF	$ 62	$ 4,216,000	Q
		Scope Contingency on "Q"	20%			$ 843,200	R
			Right of Way (Rounded)			$ 5,000,000	S

Scenario 4: HCT Envelope Preservation for Full Corridor

HCT Cost During Initial Highway Construction

Floating Bridge

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Additional floating bridge structure	Floating Bridge	216,000	SF	$ 350	$ 75,600,000	
			Subtotal			$ 75,600,000	A
Notes:		Traffic Control on "A"	0.5%			$ 378,000	B
		Construction Staging on "A"	0%			$ -	C
		Removals on "A"	0%			$ -	D
			Subtotal			$ 75,978,000	E
		Mobilization on "E"	8%			$ 6,078,240	F
		Construction Contingency on "E"	15%			$ 11,396,700	G
		Construction Cost	Subtotal			$ 93,452,940	H
		Sales Tax on "H"	8.8%			$ 8,223,859	I
		Construction Administration on "H"	10%			$ 9,345,294	J
			Subtotal			$ 111,022,093	K
		Scope Contingency on "K"	20%			$ 22,204,419	L
			Construction Total (Rounded)			$ 133,000,000	M
		Preliminary Engineering on "H"	5%			4,672,647	N
		Scope Contingency on "N"	20%			$ 934,529	O
			Preliminary Engineering (Rounded)			$ 6,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

West Side: Option A

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Lake Bridge to Montlake	New Approach Structures to Lake Washington Crossing	6,600	RF	$ 8,130	$ 53,658,000	
			Subtotal			$ 53,658,000	A
Notes:		Traffic Control on "A"	3.5%			$ 1,878,030	B
1. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Construction Staging on "A"	4%			$ 2,146,320	C
		Removals on "A"	0%			$ -	D
			Subtotal			$ 57,682,350	E
		Mobilization on "E"	8%			$ 4,614,588	F
		Construction Contingency on "E"	15%			$ 8,652,353	G
		Construction Cost	Subtotal			$ 70,949,291	H
		Sales Tax on "H"	8.8%			$ 6,243,538	I
		Construction Administration on "H"	10%			$ 7,094,929	J
			Subtotal			$ 84,287,757	K
		Scope Contingency on "K"	20%			$ 16,857,551	L
			Construction Total (Rounded)			$ 101,000,000	M
		Preliminary Engineering on "H"	8%			5,675,943	N
		Scope Contingency on "N"	20%			$ 1,135,189	O
			Preliminary Engineering (Rounded)			$ 7,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

West Side: Option B (Not usable with 8 lane tunnel)

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Lake Bridge to Montlake	New Approach Structures to Lake Washington Crossing	6,600	RF	$ 8,130	$ 53,658,000	
			Subtotal			$ 53,658,000	A
Notes:		Traffic Control on "A"	3.5%			$ 1,878,030	B
1. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Construction Staging on "A"	4%			$ 2,146,320	C
		Removals on "A"	0%			$ -	D
			Subtotal			$ 57,682,350	E
		Mobilization on "E"	8%			$ 4,614,588	F
		Construction Contingency on "E"	15%			$ 8,652,353	G
		Construction Cost	Subtotal			$ 70,949,291	H
		Sales Tax on "H"	8.8%			$ 6,243,538	I
		Construction Administration on "H"	10%			$ 7,094,929	J
			Subtotal			$ 84,287,757	K
		Scope Contingency on "K"	20%			$ 16,857,551	L
			Construction Total (Rounded)			$ 101,000,000	M
		Preliminary Engineering on "H"	8%			5,675,943	N
		Scope Contingency on "N"	20%			$ 1,135,189	O
			Preliminary Engineering (Rounded)			$ 7,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
			Right of Way (Rounded)			$ -	S

Scenario 4: HCT Envelope Preservation for Full Corridor

West Side: Option C

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Widen Montlake Lid for HCT Tunnel Enterance	Non Ventilated Lid	17,500	SF	$ 145	$ 2,537,500	
	Approach Bridge to Montlake	New Approach Structures to Lake Washington Crossing	6,600	RF	$ 8,130	$ 53,658,000	
		Subtotal				$ 56,195,500	A
Notes:		Traffic Control on "A"	3.5%			$ 1,966,843	B
1. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Construction Staging on "A"	4%			$ 2,247,820	C
		Removals on "A"	0%			$ -	D
		Subtotal				$ 60,410,163	E
		Mobilization on "E"	8%			$ 4,832,813	F
		Construction Contingency on "E"	15%			$ 9,061,524	G
		Construction Cost	Subtotal			$ 74,304,500	H
		Sales Tax on "H"	8.8%			$ 6,538,796	I
		Construction Administration on "H"	10%			$ 7,430,450	J
		Subtotal				$ 88,273,746	K
		Scope Contingency on "K"	20%			$ 17,654,749	L
		Construction Total (Rounded)				$ 106,000,000	M
		Preliminary Engineering on "H"	8%			5,944,360	N
		Scope Contingency on "N"	20%			$ 1,188,872	O
		Preliminary Engineering (Rounded)				$ 7,000,000	P
		Additional ROW for Widened Lid	20,000	SF	$ 175	$ 3,500,000	Q
		Scope Contingency on "Q"	20%			$ 700,000	R
		Right of Way (Rounded)				$ 4,000,000	S

East Side: Evergreen Point Bridge Option A

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Redesign BRT for future HCT displacement						
	Approach Bridge to Evergreen Point	New Approach Structures to Lake Washington Crossing	1,000	RF	$ 8,130	$ 8,130,000	
		Subtotal				$ 8,130,000	A
Notes:		Traffic Control on "A"	15%			$ 1,219,500	B
1. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Construction Staging on "A"	20%			$ 1,626,000	C
		Removals on "A"	10%			$ 813,000	D
		Subtotal				$ 11,788,500	E
		Mobilization on "E"	8%			$ 943,080	F
		Construction Contingency on "E"	15%			$ 1,768,275	G
		Construction Cost	Subtotal			$ 14,499,855	H
		Sales Tax on "H"	8.8%			$ 1,275,987	I
		Construction Administration on "H"	10%			$ 1,449,986	J
		Subtotal				$ 17,225,828	K
		Scope Contingency on "K"	20%			$ 3,445,166	L
		Construction Total (Rounded)				$ 21,000,000	M
		Preliminary Engineering on "H"	15%			2,174,978	N
		Scope Contingency on "N"	20%			$ 434,996	O
		Preliminary Engineering (Rounded)				$ 3,000,000	P
		Right of Way		SF		$ -	Q
		Scope Contingency on "Q"	20%			$ -	R
		Right of Way (Rounded)				$ -	S

East Side: Evergreen Point Bridge Option B

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Additional 35' of width to Evergreen Point Lid	Non Ventilated Lid	17,500	SF	$ 145	$ 2,537,500	
	Approach Bridge to Evergreen Point	New Approach Structures to Lake Washington Crossing	1,000	RF	$ 8,130	$ 8,130,000	
		Subtotal				$ 10,667,500	A
Notes:		Traffic Control on "A"	15%			$ 1,600,125	B
1. For HCT approach structure costs use unit cost item 4150 - New Approach Structure to Lake Washington Crossing without rail and systems cost.		Construction Staging on "A"	20%			$ 2,133,500	C
		Removals on "A"	10%			$ 1,066,750	D
		Subtotal				$ 15,467,875	E
		Mobilization on "E"	8%			$ 1,237,430	F
		Construction Contingency on "E"	15%			$ 2,320,181	G
		Construction Cost	Subtotal			$ 19,025,486	H
		Sales Tax on "H"	8.8%			$ 1,674,243	I
		Construction Administration on "H"	10%			$ 1,902,549	J
		Subtotal				$ 22,602,278	K
		Scope Contingency on "K"	20%			$ 4,520,456	L
		Construction Total (Rounded)				$ 27,000,000	M
		Preliminary Engineering on "H"	15%			2,853,823	N
		Scope Contingency on "N"	20%			$ 570,765	O
		Preliminary Engineering (Rounded)				$ 3,000,000	P
		Additional ROW for Widened Lid	20,000	SF	$ 70	$ 1,400,000	Q
		Scope Contingency on "Q"	20%			$ 280,000	R
		Right of Way (Rounded)				$ 2,000,000	S

Scenario 4: HCT Envelope Preservation for Full Corridor

East Side: East of Evergreen Point Lid

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
84th Avenue							
	Additional 35' of width to 84th Lid	Non Ventilated Lid	17,500	SF	$ 145	$ 2,537,500	
	Cut and Cover Structure at 84th ramp	HCT Cut & Cover	50	RF	$ 14,640	$ 732,000	
	Rebuild 84th ramp	Pavement	400	Lane FT	$ 67	$ 26,800	
	Convert FB-1 Stormwater pond to vault system under roadway	Detention vault equal to pond stroage	91,875	CF	$ 12	$ 1,102,500	
92nd Avenue							
	Additional 35' of width to 92nd lid	Non Ventilated Lid	17,500	SF	$ 145	$ 2,537,500	
East of I-405							
	Cut and Cover Structure under SR 520	HCT Cut & Cover	1,200	RF	$ 14,640	$ 17,568,000	
	Rebuild 6 lanes across SR 520	Pavement	6,000	Lane FT	$ 67	$ 402,000	
			Subtotal			$ 22,368,800	A
Notes:		Traffic Control on "A"	15%			$ 3,355,320	B
1. Use HCT unit cost item 1160 - Cut and Cover Dual Track Tunnel Suburban minus track and systems cost.		Construction Staging on "A"	20%			$ 4,473,760	C
		Removals on "A"	10%			$ 2,236,880	D
			Subtotal			$ 32,434,760	E
		Mobilization on "E"	8%			$ 2,594,781	F
		Construction Contingency on "E"	15%			$ 4,865,214	G
		Construction Cost	Subtotal			$ 39,894,755	H
		Sales Tax on "H"	8.8%			$ 3,510,738	I
		Construction Administration on "H"	10%			$ 3,989,475	J
			Subtotal			$ 47,394,969	K
		Scope Contingency on "K"	20%			$ 9,478,994	L
			Construction Total (Rounded)			$ 57,000,000	M
		Preliminary Engineering on "H"	15%			5,984,213	N
		Scope Contingency on "N"	20%			$ 1,196,843	O
			Preliminary Engineering (Rounded)			$ 7,000,000	P
	Right of Way for widened median area		80,000	SF	$ 70	$ 5,600,000	M
	Right of Way along SR 520 to L Washington Blvd		260,000	SF	$ 70	$ 18,200,000	M
	Right of Way from I-405 to 124th		112,000	SF	$ 175	$ 19,600,000	M
		Scope Contingency on "Q"	20%			$ 8,680,000	R
			Right of Way (Rounded)			$ 52,000,000	S

124th to WLSP

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
51st Ave							
	Cut and Cover Structure under SR 520 at 51	HCT Cut & Cover	1,900	RF	$ 14,640	$ 27,816,000	
	Rebuild 6 lanes across SR 520	Pavement	6,000	Lane FT	$ 67	$ 402,000	
			Subtotal			$ 28,218,000	A
Notes:		Traffic Control on "A"	4%			$ 1,128,720	B
1. Use HCT unit cost item 1160 - Cut and Cover Dual Track Tunnel Suburban minus track and systems cost.		Construction Staging on "A"	5%			$ 1,410,900	C
		Removals on "A"	5%			$ 1,410,900	D
			Subtotal			$ 32,168,520	E
		Mobilization on "E"	8%			$ 2,573,482	F
		Construction Contingency on "E"	15%			$ 4,825,278	G
		Construction Cost	Subtotal			$ 39,567,280	H
		Sales Tax on "H"	8.8%			$ 3,481,921	I
		Construction Administration on "H"	10%			$ 3,956,728	J
			Subtotal			$ 47,005,928	K
		Scope Contingency on "K"	20%			$ 9,401,186	L
			Construction Total (Rounded)			$ 56,000,000	M
		Preliminary Engineering on "H"	6%			$ 2,374,037	N
		Scope Contingency on "N"	20%			$ 474,807	O
			Preliminary Engineering (Rounded)			$ 3,000,000	P
		Right of Way along SR 520	562,400	SF	$ 62	$ 34,868,800	Q
		Scope Contingency on "Q"	20%			$ 6,973,760	R
			Right of Way (Rounded)			$ 42,000,000	S

Redmond Way to NE Union

Location	Description	Type	Quantity	Unit	Unit Cost	Cost	
	Design to Accommodate HCT crossing	Pavement	0	Lane FT	$ 67	$ -	
			Subtotal			$ -	A
Notes:		Traffic Control on "A"	10%			$ -	B
		Construction Staging on "A"	10%			$ -	C
		Removals on "A"	5%			$ -	D
			Subtotal			$ -	E
		Mobilization on "E"	8%			$ -	F
		Construction Contingency on "E"	15%			$ -	G
		Construction Cost	Subtotal			$ -	H
		Sales Tax on "H"	8.8%			$ -	I
		Construction Administration on "H"	10%			$ -	J
			Subtotal			$ -	K
		Scope Contingency on "K"	20%			$ -	L
			Construction Total (Rounded)			$ -	M
		Preliminary Engineering on "H"	10%			$ -	N
		Scope Contingency on "N"	20%			$ -	O
			Preliminary Engineering (Rounded)			$ -	P
		Right of Way along SR 520	68,000	SF	$ 62	$ 4,216,000	Q
		Scope Contingency on "Q"	20%			$ 843,200	R
			Right of Way (Rounded)			$ 5,000,000	S

Scenario 4: HCT Envelope Preservation for Full Corridor

Future HCT Cost	
No Work	*(No Cost)*